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Special automatic machines working on shells for the famous 75 millimeter guns in a French automobile factory

War Rushes French Plants

Automobile Factories Working 24 Hours a Day on Ammunition, Aeroplane and Military Supplies

By W. F. Bradley

Special Representative of THE AUTOMOBILE with the Allied Armies in France

PARIS, May 26—French automobile exports have almost ceased to exist, private sales have been reduced to an insignificant figure, and yet the automobile factories of France have bigger staffs and higher pay-rolls than in normal times. The explanation of the apparent anomaly is that the automobile factories of France are a part of the war machine, and as such are working on the production of the material most necessary to the troops in the field.

The war trumpet cleared the automobile factories of men quicker than the dinner bell ever accomplished it. A few weeks fighting showed that the guns were using up ammunition faster than the state factories could furnish it, that the number of guns was altogether insufficient for modern requirements, and that the automobile service would have to be increased on a scale undreamed of by the most enthusiastic supporters of mechanical traction.

So far as the automobile factories were concerned, this work of supplying material was entrusted to the Service des Forges, which took on its staff the officials of one of the leading automobile trade associations, corresponding in general to the National Automobile Chamber of Commerce, Inc., in America. This association, knowing every detail of the automobile trade, could organize resources much more efficiently than the war department itself was capable of doing.

There were no men, for in the middle of September three-quarters of the automobile factories of France were closed down. The manufacturers who had accepted contracts for army material drew up lists of the engineers and workmen they required to complete such work. Soldiers in the trenches, in forts, and at bases, received orders to return home and take up their ordinary work. These men threw off the uniform, but they did not cast off military obligations. They received the wages they had been drawing before the war, compared with the payment of 1 cent per day while in the field, but they had no right to change their employment for higher pay or any other reason. It is with such military controlled workmen, supplemented by those who are free from army obligations, by refugees from the northern provinces of France and by thousands of Belgians, that the French automobile factories are manned at the present time.

The most important work undertaken by the factories is the production of the famous 75 millimeter shells. No figures can be given, but it is possible to state that the output of such shells is prodigious. Many factories are producing as high as 5,000 shells every 24 hours. The army provides the steel bars; the factories cut the bars to length, bore them, turn them, shape them under the steam hammer, heat treat them, test the metal for hardness, test the shell under hydraulic pressure, make and fit the time fuse, clean and pack them, then send them to the state powder factories.

Big Demand for Automatics

A fixed price is paid per shell. As many small shops with only a dozen or so men and very poor equipment are able to make a living wage on the army contracts, it is possible for the big firms, well stocked with automatic machinery, to clean up a substantial profit. This special war work has caused an enormous demand for American automatics, although the heads of some American machine tool firms in France deny that business is good. It is only necessary, however, to see the stacks of machinery at the various ports, and to note the additions in the factories, to realize that the American manufacturers are well supplied with orders. There are factory buildings around Paris which for years have stood empty, but which since the outbreak of the war have been filled with American machinery exclusively for the production of shells and other war material. Many examples could be given of small men who had the foresight at the beginning of this period to purchase a few automatics and accept army contracts. Within 3 months many of these men have wiped off the entire first cost of the machinery. The head of one of the leading French factories remarked to the writer: "The public notes that we are not delivering cars and assumes that we are in a poor condition. As a matter of fact we have more men employed than at any period of the firm's history; if the war stopped today we should still have 6 months' contracts in hand, and we are not losing money on any job we undertake."

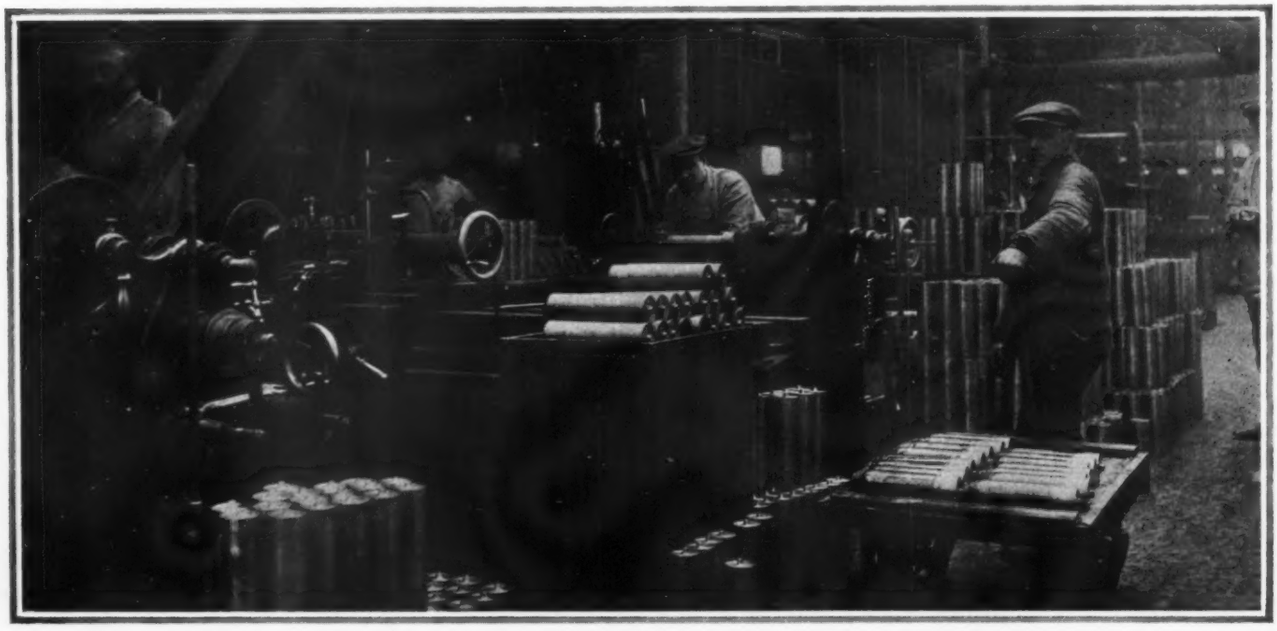
High-Power Aeroplane Motors Wanted

In addition to shells, the automobile factories are well equipped for producing tripods for quick-firing guns, aeroplane darts and bombs, aeroplanes and aeroplane motors, and of course the usual automobile material for military purposes. The quantity of aeroplanes and aeroplane motors required is one of the many surprises of this war. This matter does not particularly concern automobile manufacturers, although some French car manufacturers are building aeroplanes in their body shops, but it is worth noting that the monoplane has practically ceased to exist. Bleriot, the leading monoplane manufacturer, is supplying no more machines to the army, and is reduced to building biplanes for a rival firm. The objections to the monoplane are difficult vision and lack of weight carrying capacity. This change resulted in the adoption of higher powered motors and the use of a greater number of fixed motors than formerly. More Farman biplanes are supplied to the army than any two other makes combined. As nearly all these aeroplanes are fitted with the Renault eight-cylinder air-cooled motor, the result is a very great demand on this firm's resources. One aeroplane motor firm employing 300 men before the war is now running with a staff of 1,500.

Although the French factories are capable of producing a small number of touring cars, they are not seeking to develop business on these lines. Cast steel parts are rare, forgings are difficult to get. As an instance, one firm having to purchase a set of axles to complete a series of cars, was obliged to pay $26 each for a forging which originally cost $4. When present stocks are exhausted, it will be impossible to produce more cars. Even those firms well stocked with material and having facilities for assembling are not trying to increase sales, for they realize that prices are bound to rise and that the demand will not fall off. Already prices have gone up. The rise began with the abolition of discounts. It was followed by a positive increase. Peugeot has placed $100 on the price of its medium cars. Darracq has increased the price of a $1,900 car by $500. Corresponding increases have been made in all other factories.

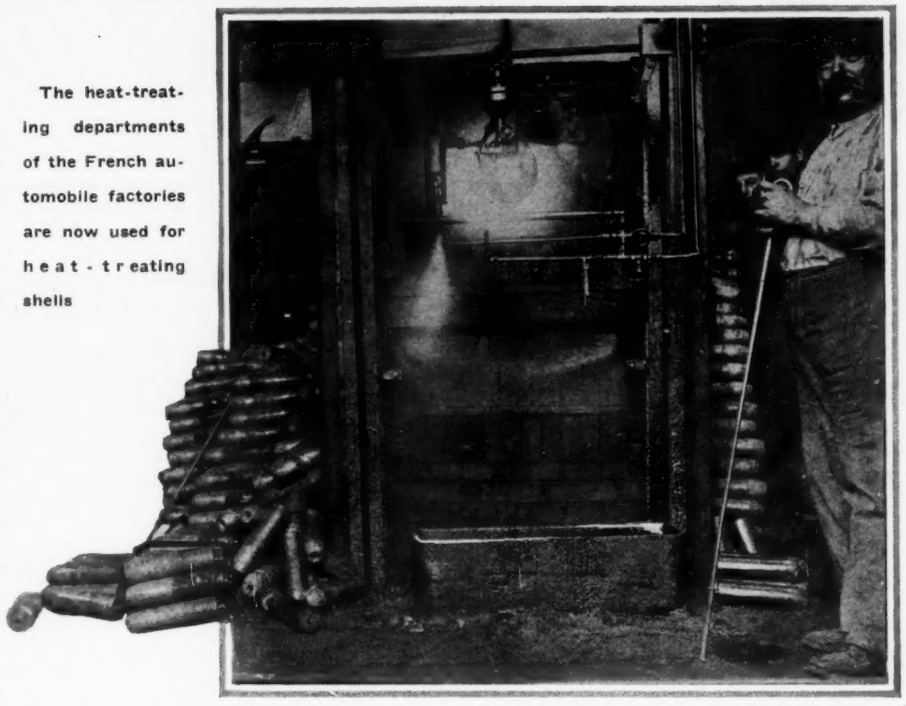
Castings and Forgings Required

Attention has been paid to the possibility of getting material, principally castings and forgings, from America. Up to the present factory managers do not appear to have secured what is needed. They state that American firms do not produce just the kind of material they need and are not sufficiently impressed with the size of the orders to go out



Typical scene in a French automobile factory, showing the manufacture of 75 millimeter shells

of their way to make it specially for them. This problem of material is the most serious of the several automobile manufacturers have to face. Most of the forges and foundries are in the north, in the hands of the enemy. It is not known in what condition they will be when the Germans are driven out, nor what length of time must elapse before they can be put into working order. Even under the most advantageous conditions there must almost inevitably be a period during which the automobile factories will be held up by reason of shortage of material. One Belgian firm famous for its stampings, declares that it has got over the difficulty, and will resume business at the cessation of hostilities on the same scale as before, and without a moment's delay. The firm, which does not wish its name to be published, has opened a special factory in England, where it is already producing for the Continental automobile trade. If the Belgian factory, at present intact, should be destroyed, additions will immediately be made to the English establishment. If the Belgian works escape they will be manned immediately after the war to supplement the English factory. Practically the whole of the expert staff has emigrated to England and has been kept in the service of this company. This is a particularly favorable case due to energetic management. On the other hand, there are supply firms which will have the greatest difficulty in returning to the old conditions.



The heat-treating departments of the French automobile factories are now used for heat-treating shells

No Paris or London Show This Year

There can be no automobile show in either Paris or London this year. The earliest possible date for a show is at the end of 1916. The war has not had the effect of stopping experimental work. It would be possible to mention the names of several French firms having been able to prepare entirely new models, and of others having incorporated improvements in ante-war cars. This has been rendered possible by the fact that the heads of departments have in most cases been returned to the factories to supervise the production of war material and while doing this can also undertake experimental work. Although new models are being designed, built and tested, it is altogether impossible to build them commercially, and no such steps can be taken until the close of the war. The point is that there will not be the serious gap in the course of development which might have been supposed by a person viewing the situation from a distance. The fact, too, should not be overlooked that every make of car on war service is being subject to a test which was never dreamed of in peace days. Manufacturers are learning lessons. As instances, one of the biggest and most successful English firms has had an epidemic of broken steering knuckles, a defect which was unknown before the war; another make of car has so frequently failed in the matter of suspension that it has been redesigned in this respect and a third has finished with thermo-syphon cooling.

No One Would Buy Cars

Internal conditions in France are such that even if cars could be built nobody would buy them. Every car owner is liable to have his machine seized for military purposes, and with the possibility of losing $100 on the transaction, there is little inducement to purchase a new car. The only cars free from the attacks of the requisition officer are light, low-powered two seaters or cars having been in service more than 3 years. It is a difficult matter to evade the army impressments. Every automobile in France figures on a military census, together with all particulars regarding it down to the make and size of the tires. Some owners who wish to keep their cars for future service have had the idea of sending them to garages to be overhauled, giving instructions that the work should occupy several months; others have sent their machines to the bodymaker for repainting and storage. These attempts at evasion are overcome by army officials visiting the garages, seizing the car in its incomplete condition, having it repaired at the military shops, and deducting the cost of the work from the price paid for the car.

Automobiling Discouraged

Apart from the requisition danger, the use of automobiles by the non-military public is discouraged. In many cases there is absolutely no reason for this, for there is abundance of gasoline, tires can be had in any quantity and the roads are not encumbered by the military. The writer has frequently made runs of 200 miles each, over main highways, without meeting half a dozen cars, either civil or military. For a depth of about 20 miles back of the 400-mile battle front, there is an army zone into which no civil automobile can penetrate. Behind this zone is a reserved army zone, varying in depth from 20 to 100 miles, to travel in which it is necessary to have a pass delivered by the military authorities; the pass must bear the photograph and signature of every person in the car; it is available for a single journey, on a determined date, over a clearly indicated route, and if used under any other conditions the holder is liable to punishment and loss of the car. Even to travel in and around Paris a special police pass must be obtained and renewed every fortnight. Many doctors in the reserved army zone are not able to get passes to use their cars. The system of examination on the road is not as vexatious as in the early stages of the war. It is sometimes possible to travel 100 miles without having to show the pass, for guards are only placed at the entrance to important towns and on important

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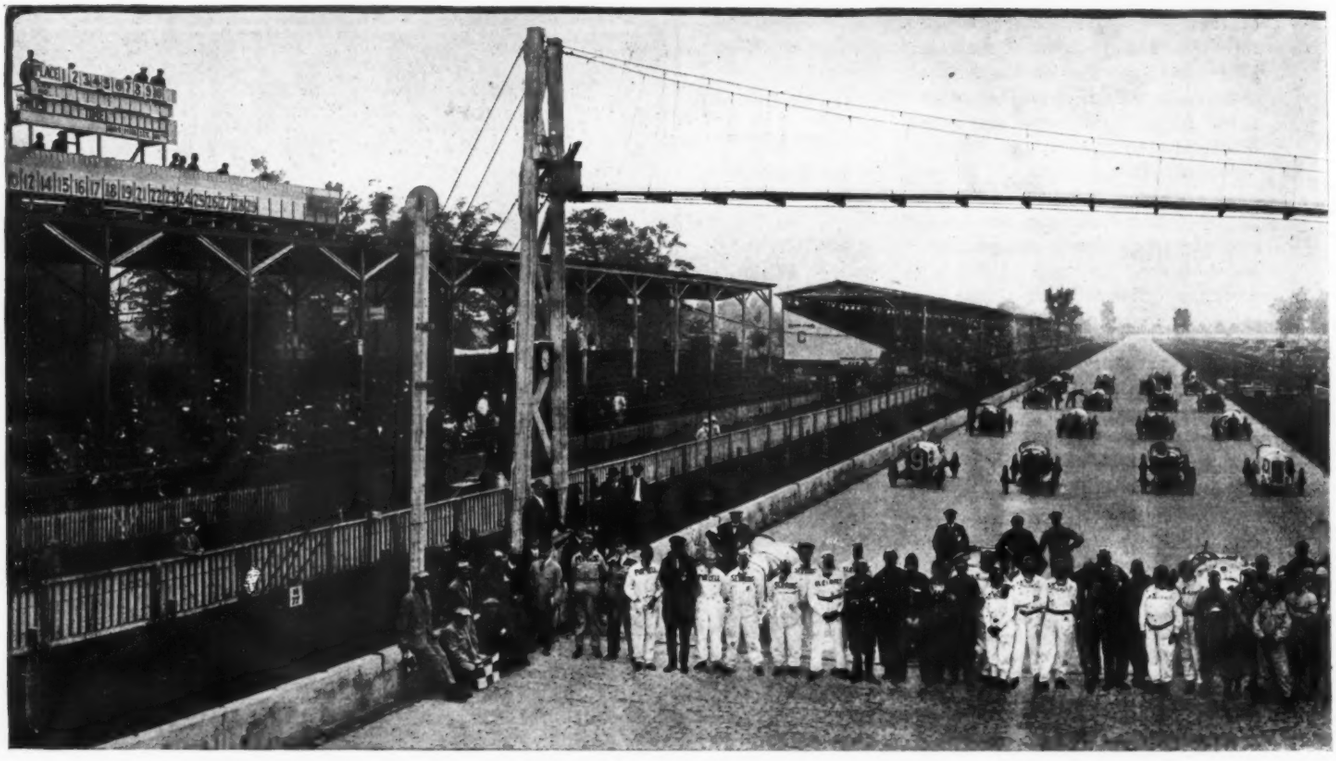


Line-up of the drivers, mechanicians, officials and other direct participants in the 500-mile annual sweepstakes at the Indianapolis motor traveling at a rate of nearly 90 miles

The 500-Mile Race in Retrospect

Engineering Effect on Touring Car Design Likely To Be Pronounced—Future of Sixteen-Valve Motor

By A. Ludlow Clayden

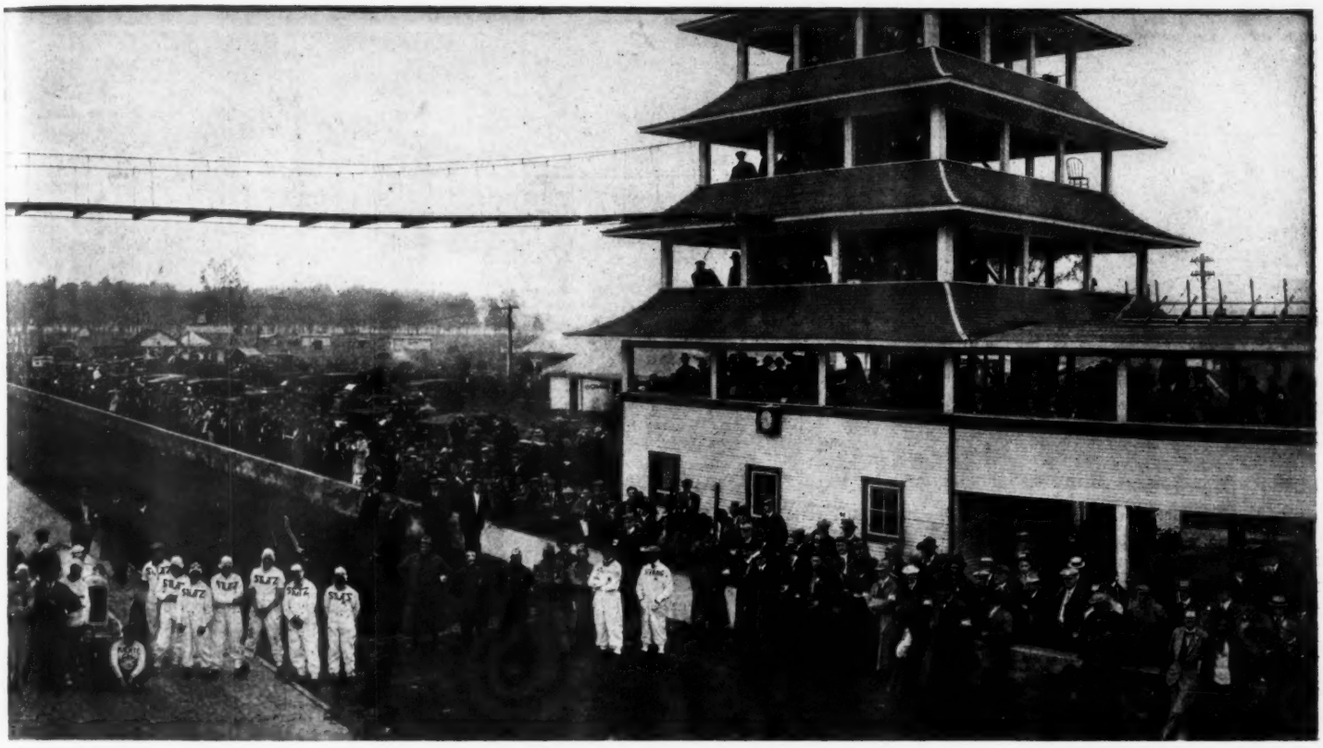
JUST as the French Grand Prix race at Amiens in July, 1913, showed that the super-tuned standard type of motor no longer had a chance in any classic contest, so has the Indianapolis 500 in 1915 made clear the fact that only highly special designs can hope for future successes in America. In previous years we have seen the foreign cars win because their engines were more powerful than those being made in America. In the race just run the same thing has happened, but it has happened by a much narrower margin. What the Stutz company can do other American manufacturers can and will do also, and it is safe to predict that the supremacy of the foreign made cars in American racing is at an end. Just as the Peugeot designs used in 1912 created the vogue of the sixteen valve racing motor in Europe, so will the Stutz success create the same vogue here.

Effect on Touring Cars

In early days of racing the design of the touring car was decided by the battles of the road, cars in the lump were so bad that the racing vehicle could not be any stronger or more powerful than the car needed by the average private individual. So each year saw new ideas tried out on the road in contest with other people's ideas and the good notions survived, appearing in the next season's cars. Gradually, however, the effect of racing grew less easy to observe, first were eliminated the breaking of frames and axles, the dislocation of steering gears and the dropping off of small parts. Next the high-tension magneto did away with ignition troubles and last the long stroke motor displaced the original "square" type with equal stroke and bore.

All these things had a direct and immediate effect upon the touring car, and during 1910, 1911 and 1912 little motor details such as valve proportions, compressions, stroke to bore ratios and carbureter design were tried out and the good ones incorporated in regular series production. With the 1913 season however, a great change came about. The truth was that the standard type of motor with L or T head and two valves per cylinder had been made efficient up to the limit. The last ounce of power per cubic inch had been got from it and engineers were at the end of their resources.

Then along came the overhead valve Peugeot and showed the way to get greater power still, setting the new fashion in racing car construction. This motor was practically all the novelty in the chassis and it was good, yet we did not find the racing of 1912 reflected in the touring cars of 1913, not even in 1914 did the overhead-valve motor become popular among European touring car manufacturers and the new designs that were ready for 1915 and which have been with-



speedway before the start of the five-century grind on May 31, in which all speed records were broken by Ralph DePalma in the Mercedes an hour around the 2.5-mile track

held were not strikingly different from the standard practice of previous years. Either engineers did not consider the ultra high-efficiency motor as necessary for a touring car, or they were afraid of it.

Limit of Practicable Speed

Power was got from the types of motors used for racing previous to 1912 by increasing the revolutions per minute a great deal and increasing the force of the explosion a little. Greater power was got from the overhead valve motors by a little increase of speed and a considerable increase in the explosion pressure and in 1914 the speeds were increased again and a trifle added to the pressures.

Now, if the weight of the reciprocating parts, the size of the bearings and all other things are the same the motor which operates at the lesser speed will have the longest life, within reasonable limits and the life of the motor is also probably in fairly direct proportion with the force of the explosion. In a touring car there are so many things to be desired *in addition to power* that it becomes questionable how far it pays to go in crankshaft speed and cylinder pressures.

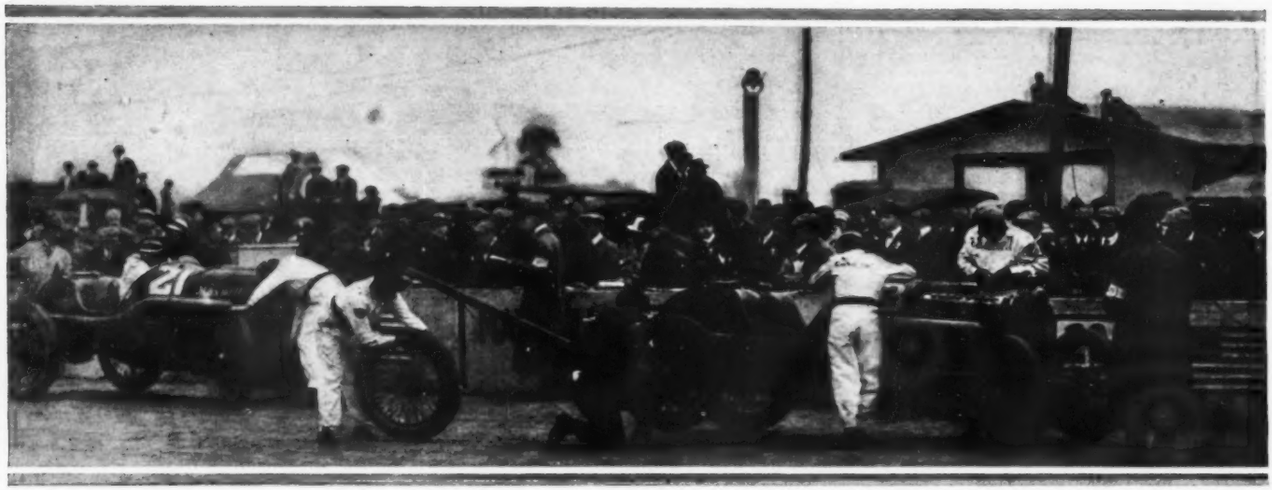
In 1912 it was a general opinion among British engineers that the usual touring car of 1915 would have a motor capable of 4,000 r.p.m. and geared about five to one. In 1914 these same engineers had found out that cars put into the hands of the ordinary user with motors intended to run frequently at 3,000 to 3,500 r.p.m. were likely to give trouble. They were extremely susceptible to carbon formation, called for extreme care in lubrication and were distinctly likely to wear out the connecting-rod bearings. Also they needed a good deal of keeping in good condition, a little slack on the valve tappets had a great effect upon the power, the engines were liable to become very noisy unless well looked after, and the carburetion was rather difficult.

Naturally these experiences did not encourage the idea of using a still more efficient type of motor and the general feeling in Europe just before the war was that it would need a few years more of racing before the overhead valve engine with sixteen valves could be worked out sufficiently to take a place in scheduled production. It may be observed that even the Peugeot company have never put out a series car in any way resembling their racing machines.

Overhead Valve Limitations

Made with a normally low efficiency, or perhaps it would be better to say a normally high power function, the overhead valve motor has been a great commercial success in America and has been used a good deal in Europe but this sort of engine has little akin to the racing motor. There is but little virtue in overhead valves *per se*, the reason they are used for racing now is simply that with them it is possible to get the greatest valve opening and so the highest speed revolution and the highest cylinder pressure. It is difficult to get quiet running with a large valve opening because a large opening means a large area of valve head and valve seat. It is similarly difficult to obtain quietness with a motor capable of very high speeds because they are got only by the use of quick lift cams which let the valves down fast instead of lowering them gently to their seatings and a quick valve descent means a snap as the valve meets the seat. We have never yet made use of the highest efficiency type of L head motor or the highest efficiency possible with two overhead valves so there is plenty of opportunity for power increase in touring car motors without going to the more expensive sixteen valve construction. This is not to say that it may not come some day, but merely to point out that there are reasons why the supremacy in racing of a particular type of motor does not make it *necessarily* desirable for ordinary cars.

Probably the most useful thing in racing experience today from the future private motorist's point of view, is the opportunity it affords for testing new materials. From racing experiments engineers find out valve metals that will



At one time during the race two of the three Maxwells were at the pits for tire changes and the pit crew had to put on top speed

stand and valve metals that burn up and, while the latter may give good enough service in a touring car it is certain that the steel that is best for the racing motor will give the longest life in a touring engine. Similarly with valve springs, with spark plugs, with light piston alloys and with high pressure lubrication systems; all can be tried to the utmost limit on the race track and the good that is in either thing can be used to advantage on ordinary cars, but these things do not show to the eye, being known only to those intimately concerned. In the race just finished the most important thing learned is that light metals will stand up for pistons and other parts, and a piston that gives no trouble during a speedway 500 is good for many years' work on the road. It is not next year that we shall see these light alloys coming more into general use, but in 1917 the effect of today's racing will certainly show. We have now demonstrated the use of aluminum in new compounds; it remains to put the production of those compounds upon a commercial basis that will permit their use in huge quantities. The writing on the wall suggests that we shall see much lighter cars in a few years time by reason of racing in 1915.

The Question of Gearing

Turning back to the high efficiency motor for a moment there is another reason which retards its general adoption, especially in America, and that is the fact that its power is obtained by virtue of its speed. Now, to use a high speed motor we must use its speed or we shall have too little power, and to utilize the speed calls for a low top gear ratio and demands gear shifting. Anent this might be mentioned the case of a popular car which is sold for a moderate price and has a fairly large four cylinder motor. As sold the power reaches a maximum of about 35 horsepower, at under 2,000 r.p.m. The makers are well aware that a slight alteration to the camshaft would give them over 60 horsepower at a correspondingly higher rate of revolution, but if they used the higher power the ability of the car to crawl on top gear would be lost, it would be necessary to change to second speed fairly often in traffic and one could no longer go very slowly up hill without shifting. Thus the power is almost cut in two and the maximum speed reduced enormously in order to give the high gear ability demanded by the user. This may be good, it may be ideal from the user's viewpoint, that is neither here nor there; but it does show that there is potent reason against the general use of a high speed engine designed to run normally at almost double the revolutions of what is now called a high speed touring car motor.

Actually one might say that the racing motor is ahead of our ability to handle it.

Motor Overdeveloped?

Just for argument's sake let us imagine a new form of transmission in which we could run the motor at a very high speed without any noisy or inefficient reduction gearing. Suppose some method for giving us an eight to one high gear ratio without any loss of power and then we might consider the possibility of using a very small motor with very high speed capability. As things are, the habits of the driver engendered by the types of car given to him for 5 or 6 years past, the nature of the transmission, the natural disinclination to attempt a reconstruction of all our ideas concerning chassis design, these things militate against any great changes in the motor.

Given the money for working out the idea it is probable that a wonderful car could be built with a 4,000 r.p.m. motor, but it would need some new sort of gearing, some new kind of gear shifting, and a tremendous advertising campaign to educate the motorist in the use and handling of the new type of car. Which simply means that to change over now and suddenly to the ultra high speed engine would be a disadvantage to everyone. The motor is years ahead of the rest of the

Anderson's Stutz at the pits for a tire change at the end of a 100-mile grind

car and we cannot put it to everyday use till the chassis has caught up in modernity. That we can go much further in motor development is to be doubted, racing car engineers hope rather to find materials that will enable the motors they have got to stand up to their own internal stresses and, if we are going to make daily use of the high-speed motor when it is got right, some one will have to develop a chassis system to suit it. Even the electrical transmissions as made at present do not seem any too promising for use in conjunction with motors far above the speed range of the ordinary.

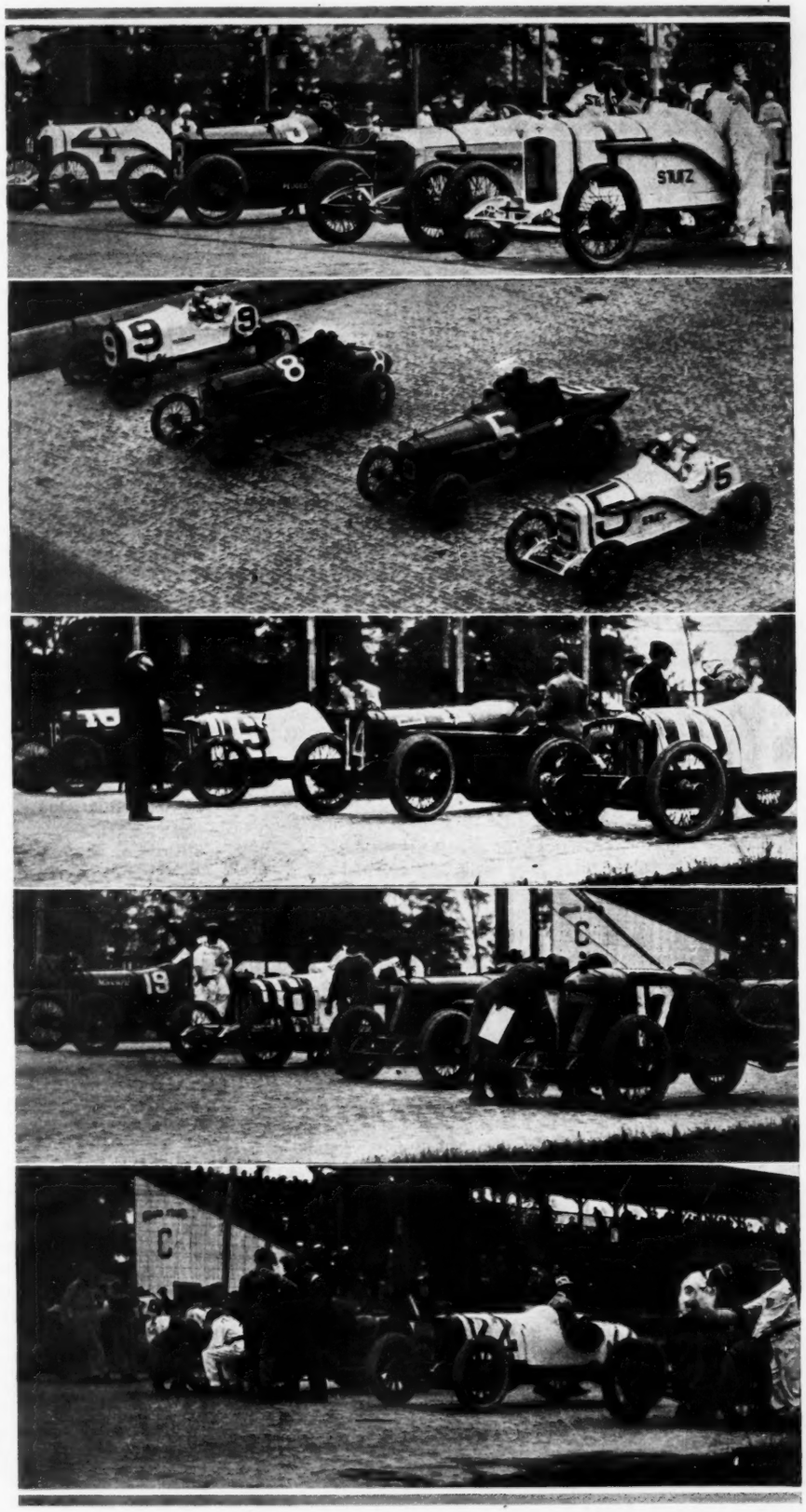
Analyzing the Troubles

It is perhaps most by analysis of the troubles that happen during a race that the lessons as they affect racing practice, are most easily appreciated. Those encountered by the Mercedes, the Peugeot and the Stutz were due to over stressed material rather than to faulty design so far as can be told. Perhaps the derangement of Resta's steering gear was due to the slacking off of a thrust adjustment merely, in which case the material ought not to be blamed, but the valve gear failures of one Stutz and the Mercedes are to be blamed on material without doubt.

Apart from these accidents far the most conspicuous trouble was with spark plugs. It was faulty plugs and faulty plugs alone apparently that put the sixteen-valve Maxwell out of the running, but it is not therefore to be assumed that the blame rests upon the plug maker. Rather it is more probable that in the motors where plug troubles were serious the point at which they were screwed into the cylinders was hotter than the corresponding point in the cylinders of the cars which had no plug trouble. Herein may lie a hint for makers of ordinary types of motor with a high power coefficient for it is well known that spark plugs do not give quite such good service in high speed motors as they used to do in the patterns most in use a couple of years ago. Since temperatures in engines rank higher as the power efficiency goes up it is safe to reckon that the faster burning up of plug points is owing to the higher heat. Just as it is necessary to care for the proper cooling of the valve seating and the parts of the cylinder adjacent thereto so is it desirable to keep the metal into which the plugs are screwed at the lowest heat.

Carburetion Lessons

Another thing which the race has shown is that there is no need to equip a racing car with a European carbureter. The success of the American instruments used on the Mercedes and Stutz shows this.



Line-up of the cars for the preliminary lap before the flying start. The pole is at the right and five of the six rows to start are illustrated, the first row being at the top and the others following in order. Drivers and cars are: Top—right to left—Wilcox, Stutz; R. De Palma, Mercedes; Resta, Peugeot; E. Cooper, Stutz. Second row—Anderson, Stutz; Porporato, Sunbeam; Burman, Peugeot; Klein, Kleinert. Third row—Alley, Duesenberg; Grant, Sunbeam; O'Donnell, Duesenberg; Babcock, Peugeot. Fourth row—J. De Palma, Delage; Von Raalte, Sunbeam; J. Cooper, Sebring; Carlson, Maxwell. Fifth row—Orr, Maxwell; Mulford, Mulford; Rickenbacher, Duesenberg; and Mais, Mais

The Engineers' Forum

The Cord Tire—Its Origin, Development and Construction—A New Flat Cord Type—The Ideal Tire

By John F. Palmer *

RIVERSIDE, ILL.—Editor THE AUTOMOBILE.—The question of the cord tire is uppermost in the minds of hundreds of thousands of motorists today, who have learned of the phenomenal performance of these tires on the racing cars at Indianapolis, where all of the eleven cars finishing the 500 miles were equipped with this type of tire. The cord tires in this race showed a marked improvement over those used a year ago, in that there was a noticeable absence of these tires being thrown from the rims, breaking of the bead, loosing treads with an exception or so, and being destroyed due to blow-outs. This race will unquestionably demonstrate the merits of the cord tire both from a standpoint of speed and also endurance. The race was one of the severest tire tests that could have been imposed, the average of 89.84 miles per hour for 500 miles being without parallel in racing history.

Origin of the Cord Tire

The name cord tire originated in England, about the year 1900, when the conventional type of cord tire was first used on automobiles to distinguish it from a lighter cord tire used on bicycles for 7 or 8 years previous. The original bicycle tire was known as the Palmer and the tire for automobiles known as the Palmer cord. The Silvertown cord tires, used on all the cars finishing at Indianapolis, is the English Palmer cord, made under license in this country by the Goodrich company.

While the present cord tire has shown its right to consideration, the writer believes that the final chapter in its development has not yet been written, and that much can be done in the way of improving the cord tire as well as in reducing the air pressure permissible.

In 1848 an Englishman named Thompson conceived the idea of binding a column of air on the rims of vehicle wheels as a cushion or insulation against the shocks due to road inequalities. Such was, and is the fundamental idea of a pneumatic tire. Its practical application has engaged the attention of a long line of inventors, as contributors to the better expression of the Thompson idea as applied to vehicles carrying their own power.

The idea of an air tire is old, yet it was 40 years or more, in the early '90's, before it was made of practical value, when J. W. Dunlop, a Dublin veterinary surgeon, applied it to the wheels of a bicycle, and the air tire came into its own, making possible comfortable road travel at high speed as compared with the then existing means and as well methods of construction of vehicles, bicycles and automobiles.

Two Requirements

None has ever found a better cushion than air; it has no fatigue point, it stores and returns the energy used in compressing it as opportunity offers and is always on duty, provided the conditions of such service are present, viz.: 1—An envelope impermeable to air under pressure that will bend out of its normal circular shape without friction or resistance other than that of the air it contains. 2—In addition to fulfill other and heavier duties, some contradictory in their nature.

Fine para rubber properly treated and vulcanized best meets the first condition. The second is the real problem; of what material and how to make that portion of the envelope that cares for all the strains incident to the air pressure in the tire and the weight of the vehicle and its load; the push of the motor in driving; the reverse strain of stopping by brake; the transverse strains of control by steering wheel; the blows of road inequalities against the air; and lastly, ignorance of its limitations, structure and care by the user.

Having in mind that most desirable characteristics in a tire envelope "that will bend or suffer distortion of its normal circular shape without friction or resistance other than the contained air-pressure," let us see how the square-woven fabric or canvas tire meets it:

First: There must be sufficient strength in the tire wall to sustain an air-pressure up to 120 pounds per square inch; multiply the pressure you carry by one-half the internal area of your tire in square inches and you get the measure of a constant duty of surprising proportions. Suppose your tire measures 100 inches in length with an internal area of 10 inches = 1-2 of 10 and 5 x 100 x 50. This gives a total pressure of 25,000 pounds, this is approximating the total constant pressure on a 32 x 4-inch tire at 50 pounds per square inch, add to this a factor of safety made necessary by the blows and shocks incident to use, and it will be plain that only by using a number of piles of such fabric can this duty be met.

What Square-Woven Means

It might be well to state that square-woven means threads of equal strength and number per inch in both warp and filler of the fabric used in the tire.

These several plies of thicknesses must be stuck or vulcanized together that they may operate as a unit. Each ply added increases the resistance to that action quoted above; and it is also found that inasmuch as the warp and filler of square woven fabric are normally disposed at right angles to each other, it is impossible to manufacture a tire of this fabric, even when it is cut on the bias and stretched over tire forms by machinery with even approximately a uniform angular placing of the threads without which a tire product with uniform performance cannot be secured. Warp is the technical name of threads running together lengthwise of a fabric and filler on warp designates the cross threads.

Second: By reason of the warp and filler threads being interwoven, and operating under high tension, there is further resistance to bending or distortion, with the added disadvantage that such bending sets up movement in the interwoven

*EDITOR'S NOTE—John F. Palmer, inventor of the cord tire for bicycles which was used first in 1893 and also the Palmer cord tires for automobiles now used in England and the Silvertown cord tire used in this country, is still engaged in the further development of this type of tire.

warp and filler of the square fabric with resulting heat and wear.

Third: As such fabric cannot be woven of sufficient width for a section cut on the bias to furnish enough length of material for one complete circuit of the tire, there is of necessity two or more joints in each ply, and wherever such a joint is made the resistance to bending is doubled, the difficulty of uniform angular placing of thread made insurmountable and the balance of strain resistance in warp and filler dislocated; when this is multiplied by the number of plies made necessary by strength requirements, the wonder is that canvas tires perform as well as they do. Added to this the difficulty of holding the tire securely on the rim of the wheel is a problem that has taxed the ingenuity of manufacturers continuously since tires were made.

The Beaded Edge

Bolts, wires and bends are the means ordinarily used; of these, the beaded-edge tire engaging a rim with a hooked edge is the most popular, with the wire edge or straight-side type growing in favor by reason of superior ease in mounting and dismounting. Both are makeshifts, however, made necessary by the character of the best material heretofore available for tire construction, namely, square-woven canvas.

It is not my intention to dwell needlessly on the short-comings of square-woven fabric, but I felt the necessity of pointing out in a general way the major objections in its use in tire construction, in order that the reason for cord tires and their advantages be made as clear as the limits of this article will permit.

Develops Flat Cord Tire

The writer is at present developing a new type of cord tire, which differs in that a ribbon or flat cord approximately 1-2 inch wide is used instead of the round cord. The chief object in substituting it for the round cord is that it allows of different construction whereby you can do away with all beads, wires, or any other method of fastening to the rim, and can have a tire which with a pressure of not over 40 pounds cannot be thrown from the rim of a racing car at any speed, as was demonstrated on the Indianapolis speedway a year ago. The use of inextensible flat cords permits of their being placed in the tire at a tangent to the rim, that is right angles to the spokes of the wheel, which is the position to obtain the most efficient transmission of power from the rim to the tread. This also is responsible for using air pressures approximately half what has been used in fabric tires.

Now, again passing the question of air tube and tread as satisfactorily solved in present-day practice, I will attempt a parallel statement of the answer the Palmer flat cord tire gives to the same questions above considered.

First: A so-called cord tire is built on a form of the natural shape of a tire, using thread or cord, singly, or a number of threads held parallel by rubber as a band or ribbon and used as such in the construction of the carcass of a tire, by applying single flat cords at a predetermined angle and continuing such application until the tire carcass is complete and consisting of two or more layers or thread, cord or bands, each layer laid at an angle to its next inside or outside neighbor.

As to the question of strength, each flat cord being laid individually as best meets the conditions of its use and protected in action from the friction or cutting movement of cross threads we are able to avail ourselves of the whole strength of each individual cord in the tire. The whole number of cords being so assembled as to work as a unit, we have as a result a structure without seam or joint; perfectly balanced as to opposed layers and disposition of their strength.

The Method of Fastening

There yet remains for consideration the matter of fastening. In the flat cord tire we have dodged this question completely, the matter of secure attachment to the rim being incidental to the design of the tire. The disposition of the cords or bands in themselves, without addition of beads, wires, bolts or any other extraneous means, provides a security of attachment and ease in mounting and dismounting far beyond anything heretofore obtained.

So much for the points considered in square-woven construction. Now in what degree does this type of tire meet the other important points as first enumerated?

I have covered air-pressure and weight of vehicle and load, as to the power impulse of motor and the reverse strain of braking; it is axiomatic that force is transmitted in straight lines, hence, that tire in which the threads or cords best meet this condition will translate into motion or work a larger proportion of the power delivered at the rim by the motor through transmission, shaft, axle and wheel.

Now, inasmuch as the material connecting the last rigid point in the power chain with the road, against which the power is exerted, is soft and flexible, it must be used identically in office and position, as a belt on a pulley to get the best results, that is, the flat cord must be laid at a true tangent from the rim, or at a right angle to the spokes, and by reason of the long, flat arch described by each cord in the tire, it has under it a longer column of the supporting air.

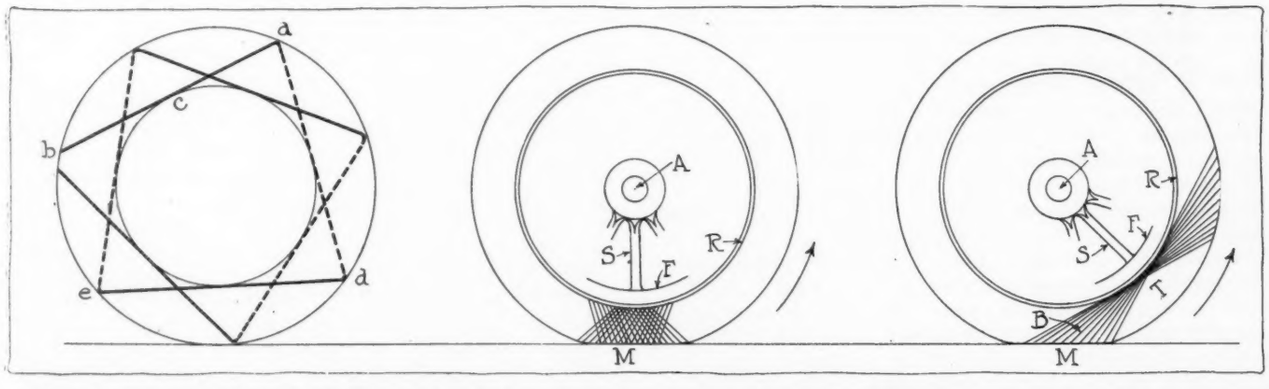


Fig. 1—Left—Construction of the Palmer flat-cord tire, showing how the cords are at tangent to any point c on the rim, one cord being represented by the line a b which, after crossing the tread at a continues at d. Similarly, all cords are tangentially placed or at right angles to the wheel spokes

Fig. 2—Center—Shows the threads in the fabric tire with their sharp angularity to the wheel rim. S indicates wheel spoke, R wheel rim, F felloe, A axle, and M that part of the tire which supports the weight, which is a relatively short section of the tire

Fig. 3—Right—Shows a section of the ideal flat-cord tire with the cords B arranged as tangents to the rim. The cords cross the tread at M and are distributed over a wide fraction of the wheel circumference so that the tire throughout a majority of its circumference forms a bridge construction supporting it at the point M

This reduces the air-pressure necessary to carry a given load, with a corresponding reduction in total strain due to air-pressure and strength required to meet it.

The above applies also to the reverse strain of stopping the car by means of brakes and contributes as well the ideal of maximum transverse rigidity necessary for positive control of the car through the steering wheel, the least motion of which is answered in full by the car to the skidding point of the front wheels. Also the blows of road inequalities are met by lower air pressure per square inch, hence a better, more receptive cushion against shocks or vibration.

The Ideal Tire

The ideal tire then would be:

1—One on which the vehicle is enabled to move along the road without shock or vibration due to inequalities of surface. This means easy riding, coasting quality, receptiveness.

2—To do this with the least expenditure of power per ton-mile; this means a combination of the coasting quality and efficient power transmission.

3—To control its course with absolute certainty up to the limit of wheel traction. This is steering wheel control, had by transverse and longitudinal rigidity in the tire carcass.

4—To bring it to a full stop in the shortest space of time. This is braking efficiency, and also is obtained by reason of longitudinal and transverse rigidity.

5—To be immune from puncture or other injury from external causes.

6—A method of attachment to the rim that is positively secure under all conditions of service yet admits of easy mounting and dismounting, and, I might add, all these without any attention whatever from the user. This latter is almost as attainable in some of the others as perfection.

Since it is impossible to incorporate in one structure the maximum of all of these ideal qualities, the tire designer is obliged to sacrifice in some measure the ideal in order to achieve the practical. For instance, easy riding, the quality first enumerated, if carried to extreme would necessitate the use of a power plant out of all proportion to the work to be performed even though the third quality, control, were not lost, as it would be in the above construction. No. 4, on braking efficiency, also is unattainable under the conditions of maximum cushioning quality or receptiveness. No. 5 would remain much as in other constructions, while No. 6, rim attachment, would be made very much more difficult than in any other type of tire. In short, the maximum of this quality of receptiveness or easy riding is an impossibility in a practical tire.

Nos. 2, 3 and 4 are bound up together and the maximum of number 2 results also in the best expression of 3 and 4.

Immunity from Puncture

The fifth desideratum, immunity from puncture is impossible of achievement in an air tire without great loss in all the foregoing and, inasmuch as a simon pure puncture is extremely rare, we can disregard this feature and devote our efforts to the elimination of rim cutting, blow-outs and pinched tubes. This latter trio embraces 95 per cent. of the trouble in pneumatic tires, aside from faulty material and construction. Rim cutting is due to bad association of rim and tire; this may mean any one of several faults covered by the above phrase, sometimes of the tire, sometimes of the rim and sometimes careless placing of the tire edges when it is put on the wheel, and often when ridden with very low or no air pressure.

Blowouts in tires, when not due to faulty manufacture, are the result of bruises, unfilled cuts in the tread which permit moisture and rot in the fabric, and breaking along the hinge or bending point through undersized tires being used, with consequent high air pressure necessary to carry the heavy overload. Fifteen per cent. is the maximum depression permitted in the Palmer tire; other tires are safe only at 10 and 12 per cent. depression.

The Ideal Fastening

The sixth ideal feature is had in the ideal tire, and in no other; the same construction that contributes maximum power, steering and brake efficiency contributes also a method of attachment that is really no attachment; that is, on inflation, the tire becomes practically a part of the wheel. This last word in joining tire and wheel has been the hope and despair of tire inventors since double-tube tires were made.

It is obvious that a tire composed of flat cords must have something to distend it forcibly in order that it may resist distortion. *This is the air pressure.* Also there must be a rigid base for the air to push against in order to distend the tire at all. *This is the rim.*

Now, as the lines of resistance, the cords must under the pressure of the air try to take the shortest route between their opposite points of attachment, the rim sides, in a canvas tire, and the cords being flexible and the pressure elastic, they will then describe an arch from one side of the rim to the other of a span dependent on the length of the cord. Now if this span describes an arch shorter than a double tangent and the rim edge, the tendency of the contained air pressure must be then to lift the tire bodily from the rim, proportionately as its angle departs from a true tangent. Hence, the various fastenings in current use of both clincher and straight-side wire edge types.

Now, in the ideal tire the lines of resistance, or the cords, describe the longest possible span in crossing from one side of the rim to the other, approximately a true double tangent as illustrated in Fig. 1. It will thus be seen that no cord stops at the rim *c*, but goes straight across to the opposite tread point *a* or *b*. It will be evident then that the lines of resistance of these cords describe what might be called the shortest route from a point on the tread of the tire to another point on the tread of the tire coinciding with a point on the rim falling within a straight line between these two points. We used to call this the chord of an arc in our school days.

Opposite Tread Points Equalize Pull

Now, therefore, if the lines of resistance, or the cords, are not attached to the rim at all, but only pass within the flange of the rim across to opposite tread points, the ideal tire cannot be said to be attached to the rim, but that opposite tread-points pull one against the other. For it must be remembered that there is no strength in a tire to resist air pressure beside the treads of which the carcass is composed, and these treads one and all take the identical course above described.

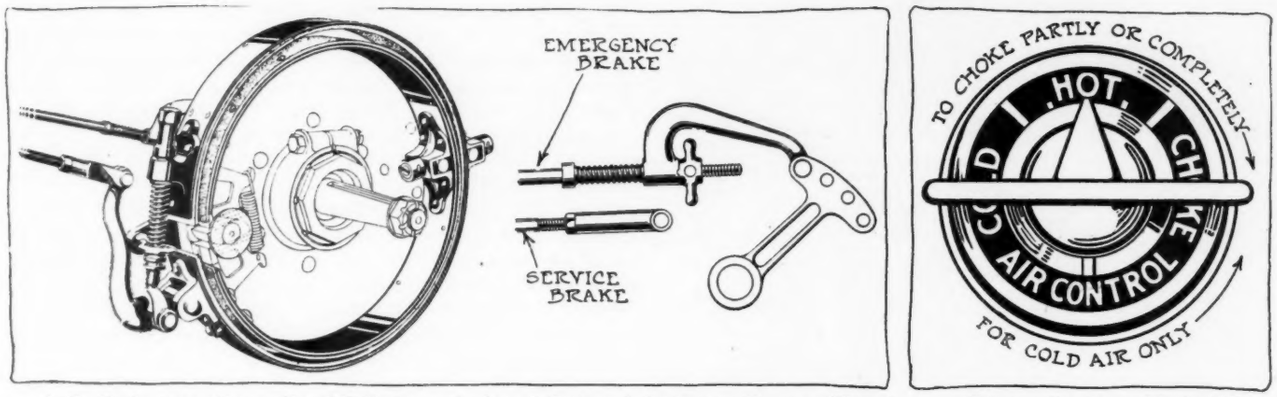
Hence, the impossibility of the radial pressure of the contained air lifting the tire from the rim in the smallest degree, as the tire simply is pulling against itself and the flanges of the rim only serve to restrain it from lateral expansion.

Limitations of the Pneumatic Tire

It seems opportune that a word as to the limitations of the pneumatic tire as a shock or vibration absorber be added here. Manifestly, this must be limited to its ability to receive into itself inequalities of and on the road surface, hence, the size of the tire again is vital and is its measure in cushioning equality, the springs assuming this function according to their ability when taking bumps beyond the capacity of the tire. In this connection, I would say that the best pneumatic tire is susceptible of as nice adjustment to its load, in size and air pressure, as are the springs, though all the resources of metallurgy be called on with all the experience of hundreds of years of spring building for vehicles.—JOHN F. PALMER, Riverside, Ill.

New Boat Body on 1916 Hudson

6-40 Continued—Refinements Increase Strength Without Adding Weight—Price $200 Lower—Few Changes



Left—Brake assembly on the 1916 Hudson. Center—Adjustment features. Four positions are possible on the lever illustrated. Right—New air control of carbureter

THE 1916 Hudson is a continuation of the six-40 of this year, with very few mechanical changes but a new type of boat design body. The price of $1,350 is $200 less than this year. Although the general characteristics of the car remain unaltered there are many details included that give greater accessibility and added strength without increasing the weight. Thus spring bolts are of larger diameter; the frame is stronger; hardened steel washers are used in places to avoid rattle; grease cups have been brought into more accessible positions; a side entrance carbureter located high on the cylinder block is used, and many other running gear improvements are found.

The new body lines incorporate an unbroken curve from one end to the other. The top edges of the upholstery are on a level with the body sides to give an unbroken line. Hood and cowl meet each other without interruption of the one curve, and the whole front shape is narrowed to meet the bonnet so that, looking at the car head on, it seems to have a gradual unbroken slope from the narrowest point at the radiator to the widest part at the rear seat.

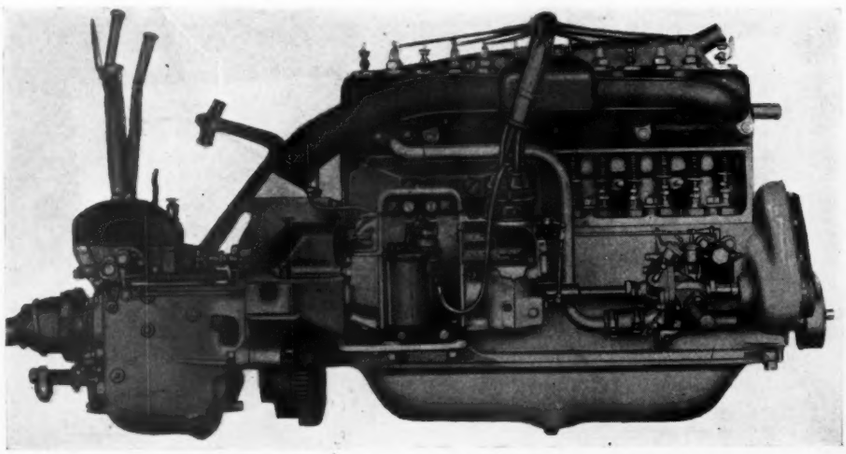
All this has been done without in any way sacrificing roominess, and, in fact, all the compartments are even roomier than before. This is especially true of the tonneau, where more length is afforded by the tunneled-under rear of the body. The auxiliary seats are improved to fold into spaces in the floor and the back of the front seat. When closed, they disappear. The doors are wider, and fit snugly. Enameled leather upholstery has been adopted in place of the dull-finished variety heretofore used.

Along with the new shape of cowl, a neat and substantial form of windshield attachment has been worked out. The side supports, instead of running straight down to the body, curve in at the bottom and join rigidly to the body. This is a change which is in accord with the narrowing of the front curve, and makes the appearance consistent.

Chassis Improvements

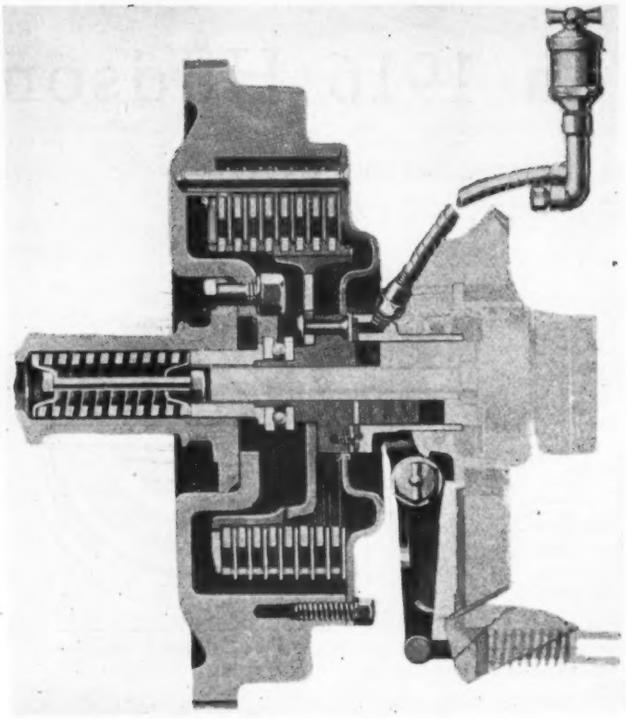
There are several small changes in the chassis and mechanical parts that would not be evident on reasonably thorough observation unless one had both chassis to compare. Most of these differences have been made with the thought of greater accessibility, less chance for rattles when the car has seen service and even better performance.

The mechanical details include a 3½ by 5, block-cast six-cylinder engine with disk clutch and three-speed gearset in unit, Delco combination ignition, starting and lighting; Zenith carbureter; left steer and center control; open drive member with Hotchkiss form of drive through the rear; three-quarter elliptic springs; tapered frame; floating axle with a pressed-steel housing; wheelbase of 123 inches; and 34 by 4 tires on demountable rims.



Exhaust side of Hudson six-cylinder motor for 1916

Among the minor improvements of rear; three-quarter elliptic springs; device on the carbureter so that the disagreeable fluttering and flapping of a trap type of valve is done away with. The new form is of barrel construction, and the entrance of hot air, cold air or the exclusion of all air is controlled by the rotation of a sleeve with slots to



How the grease cup for lubricating clutch throw-out collar is brought above the floorboards

register with either opening. To further aid in carburetion, the hot air stove, which formerly attached to the exhaust manifold, now is made integral with it. This serves as a better assembly proposition and at the same time gets the heat into the hot air tube faster.

Accessible Grease Cups

Looking to better accessibility, the grease cup for lubricating the clutch throw-out collar has been brought up above the floorboards and into the driver's compartment. A flexible tube extends from this cup down to the actual bearing surface.

With the idea of preserving the rigidity of the frame and to thus prevent movements which would tend to wear spring bearings, cause movements of the frame independently of the body, and consequently bring about rattles and squeaks much quicker, the front motor support has been stiffened, the frame is made of heavier stock, the rear cross member has been redesigned, etc. The frame stock is now 5-32-inch steel, which is slightly thicker. The channel is 5 inches deep with a width of 2 3-8 inches.

To carry rigidly the support of the front end of the rear springs, the rear cross member is now of what might be called a bridge type. Instead of having the same depth all the way across, it widens as it approaches the side members, thus making a better attachment to them. There are also gussets of pressed steel inside the frame channel and under the front end of the rear springs to prevent horizontal whipping and to keep rattles out of the shackles. To further aid in such rattle prevention, hardened steel washers have been placed between the spring eyes and the sides of the shackles to give a good wearing surface.

The spring bolts have been enlarged to 5-8-inch for the same reasons of better resistance to wear and rattle, and another noise preventative is the interposing of a strip of cotton duck between the apron and frame to avoid possible squeaks through this source.

More Fuel Capacity

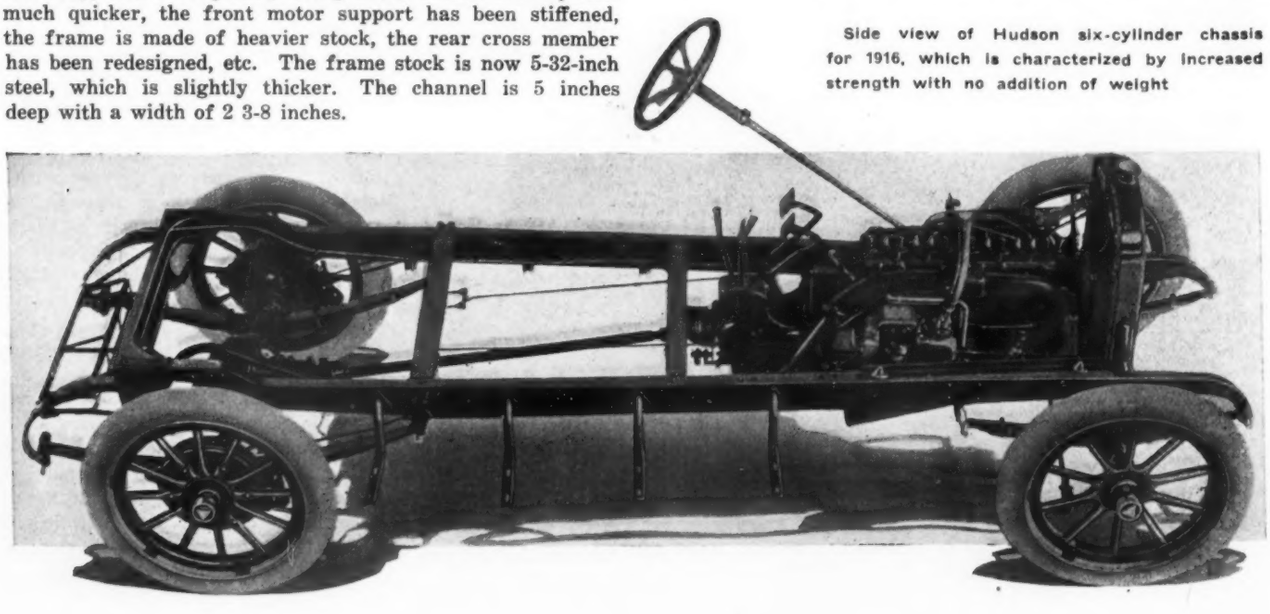
The cowl gasoline tank has been increased in capacity from 12 to 14 gallons, and it is, of course, of a new shape to conform to the different shape of cowl. Out of the car, it looks much like a crumpled reservoir, so odd is its shape. The idea was to give it as large capacity as possible without interfering with the space of the front compartment. The filler is accessible on the cowl apron, and the vent pipe has been brought all the way down to the bottom of the motor pan from the top of the tank so that any fumes coming from the tank will not get into the drive compartment, as they might do with the previous model, where the vent hole was not provided with a pipe. The desirability of having a means of getting a small amount of gasoline has been recognized also, for a drain cock has been fitted, this coming to a convenient point at the bottom of the car.

Though small in itself, the splitting of the front floor boards into two parts is important as the boards are in two halves, so that the right section can be removed without disturbing that part under the pedals. This right part permits access to the starter gears or the clutch. There is a trap door in the tonneau floor to reach the rear axle.

Adjustment of both emergency and foot brakes has been simplified. The former can now be adjusted by hand with a wing nut which is easy to reach. The foot brake adjustment is on the outside and the rod screws into a threaded socket with a set screw to hold the parts in place.

In addition to the very small change in incorporating the hot air stove with the exhaust manifold, as already mentioned, there is one other difference on the new motor. This

Side view of Hudson six-cylinder chassis for 1916, which is characterized by increased strength with no addition of weight



is the use of a bronze water pump instead of die cast aluminum, as heretofore. There is an interesting reason back of this change. Though the aluminum pump worked very satisfactorily in nearly every part of the country, it was found that in certain sections where there is alkali water, this had a tendency to disintegrate the pump, so to take care of this the brass was substituted, the alkali having no effect upon this metal.

In the general layout of the Hudson motor, the valves, exhaust manifold, water pump and electrical unit are all arranged on the right side, with nothing on the left save Zenith carbureter, which, due to the tank being high up in the cowl, is bolted well up on the side of the cylinder casting to a single opening in the casting. Distribution of the gas to the valves is done through internal passages in the casting so that there is no exposed intake manifolding.

The cylinder block bolts to a conventional form of two-part crankcase, the upper aluminum part carrying the crankshaft bearings, which are three in number. Valves are of nickel steel and interchangeable and they have a 1 1-2-inch clear opening with a lift sufficient to give rapid gas flow. The grey iron pistons carry nickel-steel tubing wrist-pins, which are a press fit in the bosses and held in place by a set screw.

Connecting-Rod Details

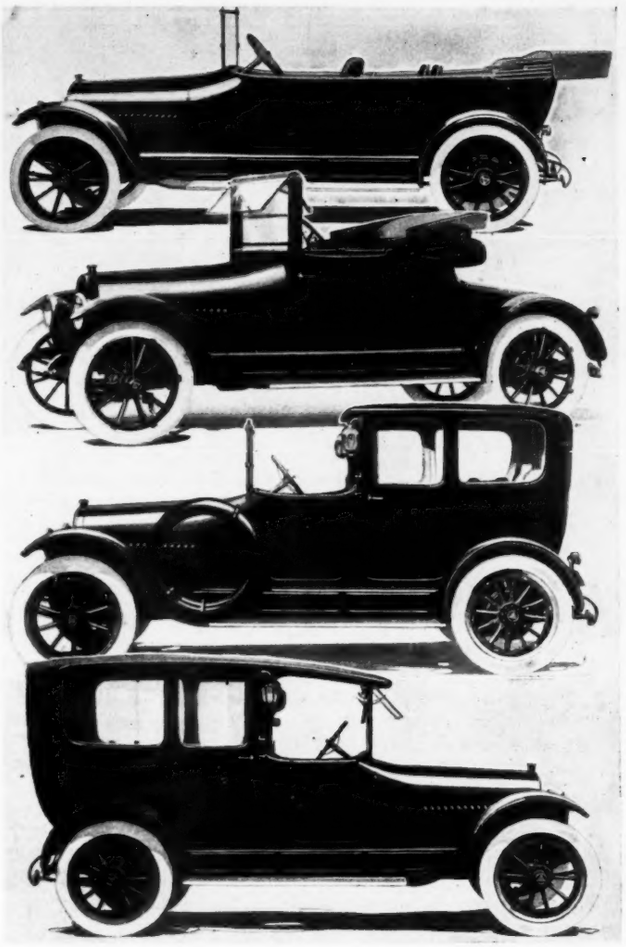
The connecting-rods are I-beam drop-forged type, and their caps are held in place by nickel-steel bolts, with castellated nuts holding cotters. The crankshaft is of a design such that the throws are so shaped as to make a running balance at all speeds, it is claimed. Nickel babbitt bearings are used not only for the main bearings but for the lower rod bearings and the camshaft. Timing gears are helically cut, and to insure quietness, they are made of a cloth composition.

A constant-level splash oiling is used in the engine, with the lower part of the crankcase the oil reservoir, it being exposed to cool the oil.

Better Delco Housings

The Delco unit has been changed to make it easier to assemble or take apart. The various parts of it are now made with their own individual housings, bolting together to make the complete unit. This is a change from the old way of having the one housing cover all parts. All bolts and nuts that were hard to get at have been extended so that they can be reached with a wrench or screw driver.

There is no alteration in the design or principle, however. The starting connection is made through the meshing of a train of reduction gears housed on right motor arm, while when acting as a generator, the unit is driven by an extension of the pump shaft, which in turn connects with the camshaft gearing.



Hudson models for 1916. Top—Seven-passenger touring car. Upper middle—Roadster. Lower middle—Cabriolet. Bottom—Limousine

In the drive mechanism, the compactness of the units makes for a general lightness of construction. The clutch is self-contained in an oil-tight case which is a part of the flywheel. The disks are steel stampings with the driving disks provided with cork inserts. The gearbox attaches to the rear of the aluminum crankcase by means of arms which bolt to the cover which goes over the upper part of the flywheel. The main and countershafts run on roller bearings and gears are of the stub tooth shape to give strength.

The Hotchkiss form of drive used saves much in weight, and is a design which Hudson was one of the first American makers to use. The torque and drive is taken through the rear springs, the master leaves of which are made strong enough for the purpose. The spring bolts at the front end of these springs are also enlarged to take care of it. In the Hudson car, these bolts have a 7-8-inch diameter. The drive shaft is a tubular form which is very strong with lightness. Two universal joints are fitted to the shaft, one at either end.

In the axle, the driving gears and differential bolt to the axle proper, and can be removed without disturbing the housing. The pinion shaft and differential case are mounted on taper roller

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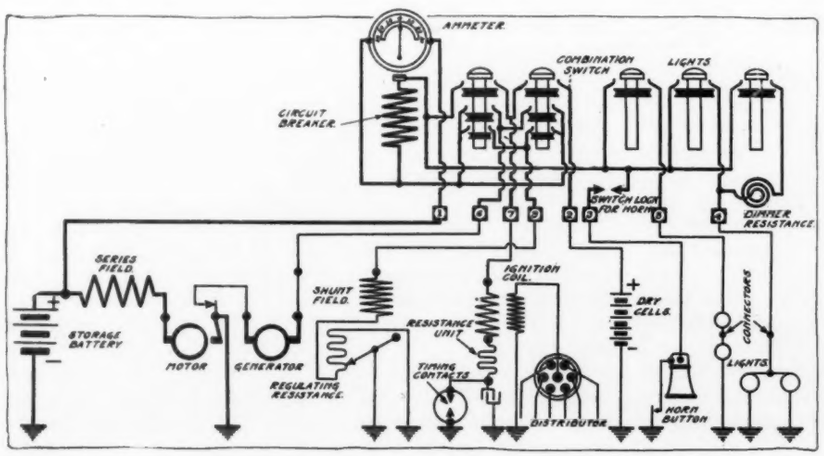
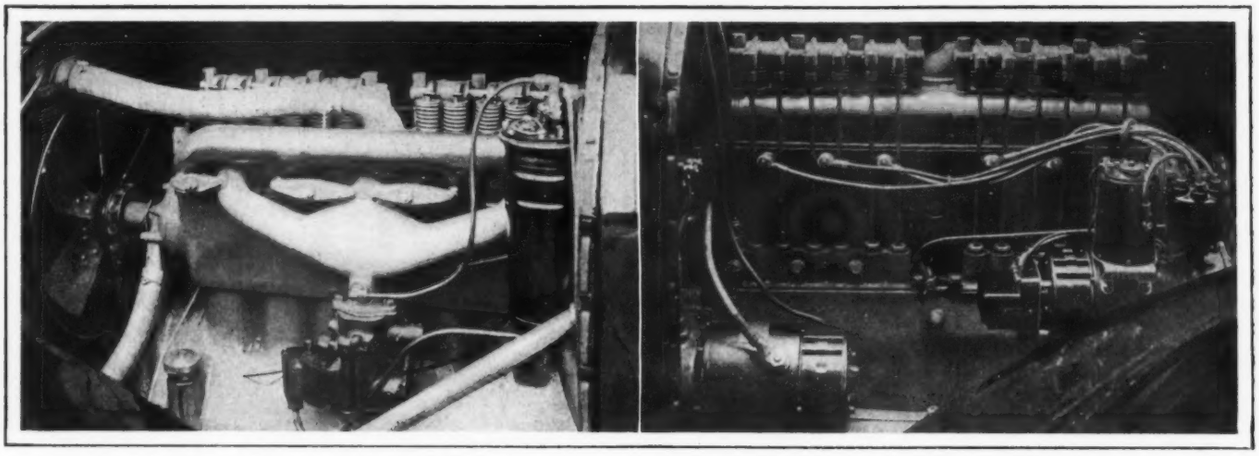


Wiring diagram of the Hudson six for 1916



Left—Carbureter side of the new little six Oakland valve-in-the-head motor, showing mounting of the Stewart vacuum tank. Right—Valve rod side, showing mounting of the electrical units

A New Low-Priced Oakland Six

Overhead-Valve Block Motor 2 13-16 by 4 3-4 of Moderate High-Speed Design—110-Inch Wheelbase—Hotchkiss Drive Through Underslung Springs

AN entirely new car selling at the low figure of $795 in either five-passenger touring car or roadster form is to be built by the Oakland Motor Car Co., Pontiac, Mich., for 1916. It is really the little six which has been considerably talked of and speculated about in motor circles as coming out under the General Motors Co. name. But though the rumors were quite right as to the existence of the little six, it will carry the Oakland name, and be built in the Oakland plants.

Due to the purchasing power of the General Motors organization, of which the Oakland company is a subsidiary, and to the capacity of the latter concern to build a big volume of cars this year, it is explained that the price could be brought down to the low figure given above.

Built upon 110-inch wheelbase, the body is surprisingly roomy, with comfortable riding for five. The rear seat measures 46 inches across. The motor is of the overhead valve type, the product of the Northway plant in co-operation with Oakland. The bore is 2 13-16 and the stroke 4 3-4 inches, and cylinders are in a block with cylinder head and valve mechanism detachable.

Oakland Tapered Frame

Many of the principles of design which have characterized other recent models of Oakland make are to be found in this car. It has the tapered frame, Hotchkiss drive through the springs, floating axle, three-quarter elliptic underslung rear springs, rear gasoline tank with vacuum feed, cone clutch and three-speed gearset in unit with the engine, Remy electrical system, Marvel carbureter, splash oiling, centrifugal pump water circulation, and 32 by 3 1-2-inch tires. From these general specifications it will be seen that Oakland is offering a very completely fitted out little six at the price.

The motor, a moderately high-speed design, is said to develop 30 to 35 horsepower in average running, and at any rate, it handles the car well under any driving conditions, as was proven in a demonstration run.

The valve mechanism is exposed, with the lifter rods on the right. They actuate the valve rockers as in any conventional overhead valve type. The rockers are assembled on two shafts, each carrying half of them with a support between each two of the rockers, these screwing into the cylinder head. This should make it very easy to remove the parts if necessary.

The adjustment of the push rods is at the top where they come in contact with the rocker arms. The valves, due to the overhead construction are rather large for the cylinder size. They are 1 1-4 inch diameter in the clear and the lift is 5-16 inch.

Accessible Motor Layout

In its general layout, the motor is compactly arranged. The carbureter and the two manifolds are placed on the left, while the right is reserved for the Remy two-unit electrical apparatus with the generator forward and the starter unit to the rear. The spark plugs go into this side of the cylinder block, one being placed between each two of the valve rods. The ignition distributer is mounted on top of the generator unit, so the ignition wires are not very long.

The upper part of the crankcase and that which carries the three crankshaft bearings is integral with the cylinder casting, which is the usual construction where the cylinder head is detachable. The lower part admits of access to the bearings and serves as the oil reservoir and the mounting for the splash troughs.

The power plant rides in the frame at three points, resting upon cross members of the frame at front and rear, this construction differing from the conventional in that there is no integral crankcase arms at the rear. This should have a tendency to reduce weight without in any way sacrificing strength.

A neat construction is that at the front which makes a combination of the water pump impeller, fan and fan bearings. The fan and water pump are really one unit, and the construction may be seen in the left side view of the engine. The water connection couples from this upper point direct to

the radiator connection. The pump case is part in the casting of the cylinder block and part in the mounting of the fan. The drive for fan and water pump is through belt connection with the crankshaft. A simpler construction of these parts could not be imagined.

Separate Motor Manifolds

Both intake and exhaust manifolds are separate from the cylinder castings and are held to them by dogs or spanners drawn down at the center by bolts screwing into bosses in the side of the cylinder head. Due to the use of the Stewart vacuum tank, on the back of the dash, the carbureter is brought well up, and there is very little vertical part to the intake manifold. The supply tank is at the rear of the chassis.

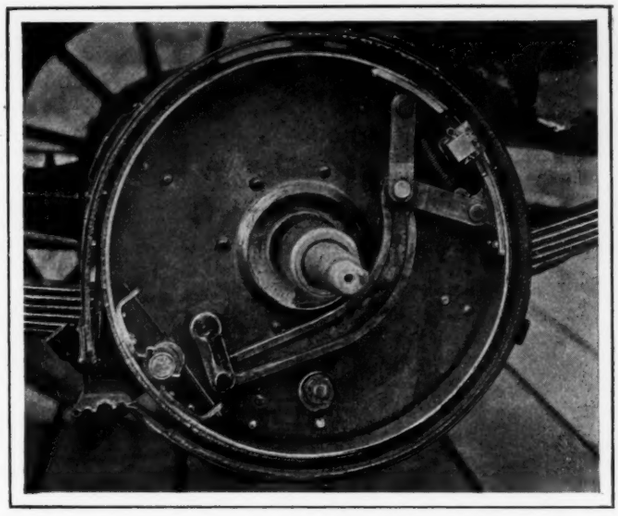
A very efficient mounting of the generator and the starting motor is employed, in that the housings of these units bolt directly to the housing of the flywheel in the case of the starter and to that of the front gears in the generator construction. Such a mounting positions the shafts accurately without possibility of putting the units back wrong. This is harder to do where a base is used to carry such units, or where some form of strap is utilized. There is a reduction of weight due to fewer parts.

Bendix Starting Drive

The starting unit connects through gear with the flywheel and through the intermediary of the Bendix drive. This is more or less familiar to the public, being fitted to several well-known makes of car now. In its principle it consists mainly of a threaded shaft on which a pinion screws loosely. This shaft is carried by the extension of the motor armature. The pinion is weighted, which weighted feature serves to carry the pinion into engagement with the flywheel teeth when the current is sent to the motor. Thus the shifting is automatic. In the Oakland application, the entire mechanism is compactly housed, with only the rear end of the starter shaft exposed. The starter ratio is 11.5 to 1.

Six-Volt Electric System

The generator and distributer combination at the front is driven by gear connection with the camshaft gear, all being completely housed. The generator is driven at 1 1-2 to 1 ratio, and from it, the vertical distributer shaft is operated by a spiral gear connection at the same speed. The electric system operates at 6 volts, and with it is used a Willard battery placed under the front seat.

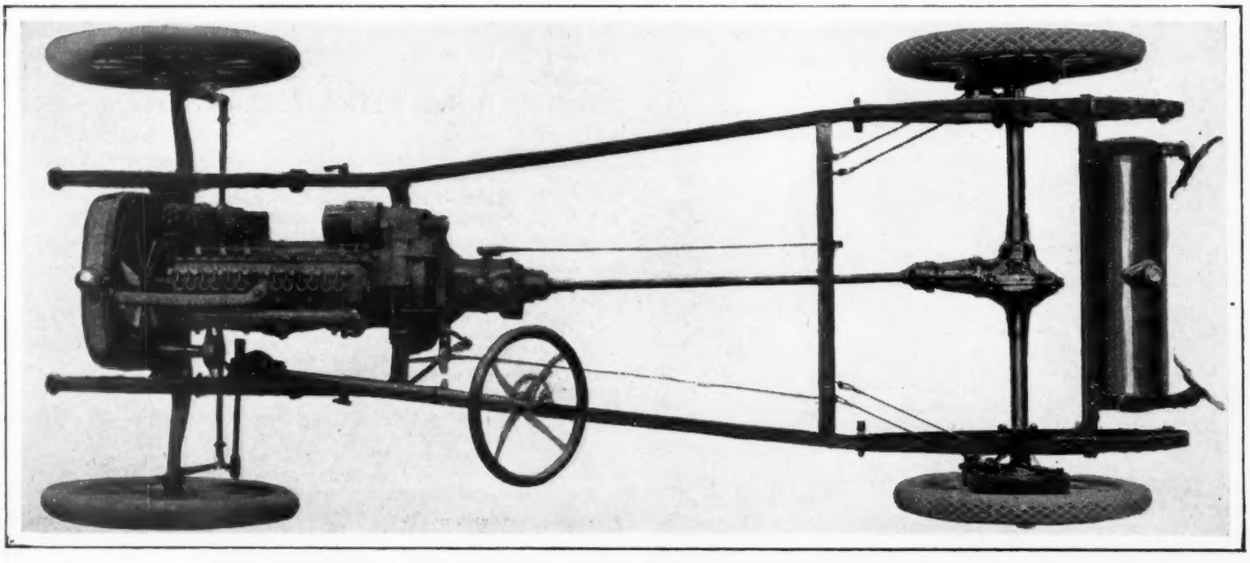


Brake mechanism on the new little six Oakland, showing the two concentric bands

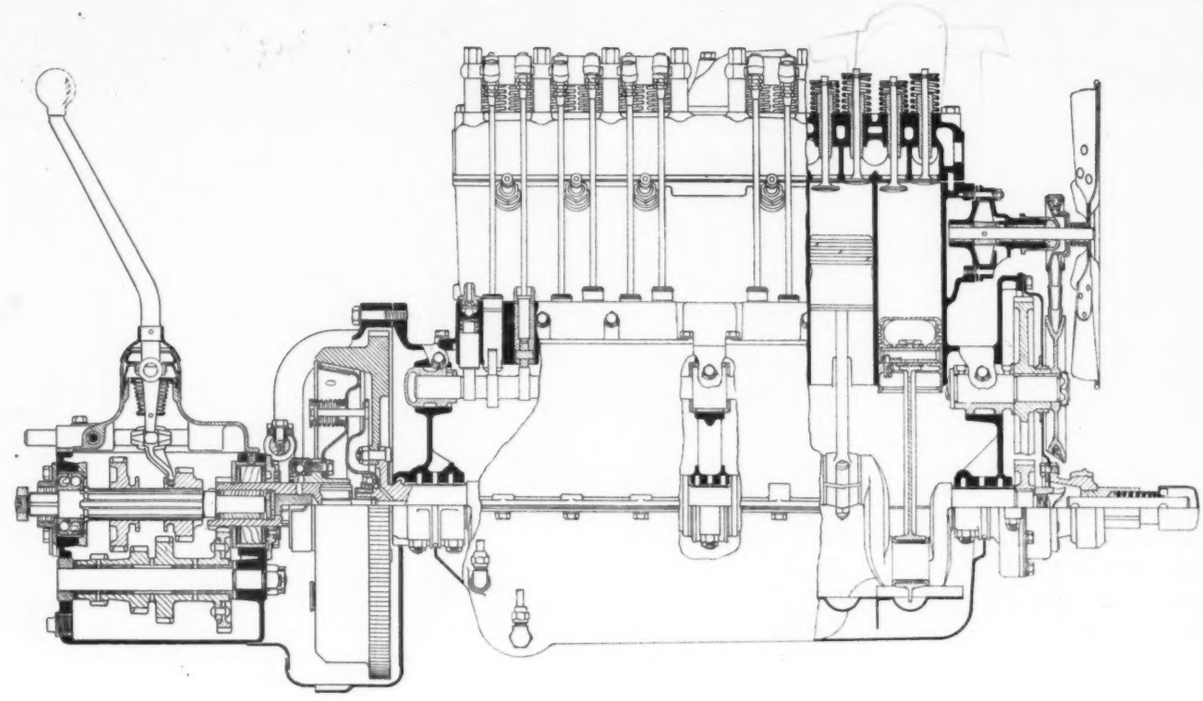
Internally the new engine shows nothing radical. Both the camshaft and the crankshaft have three main bearings, those of the latter measuring 1 7-8 inch in diameter. The pistons and connecting-rods follow the usual form. The motor oiling embodies the circulating splash system, with circulation maintained by a plunger pump operated by eccentric on the camshaft. The oil is forced first to a dash sight feed, and thence down to the splash troughs and the bearings. An oil level indicator is placed on the crankcase.

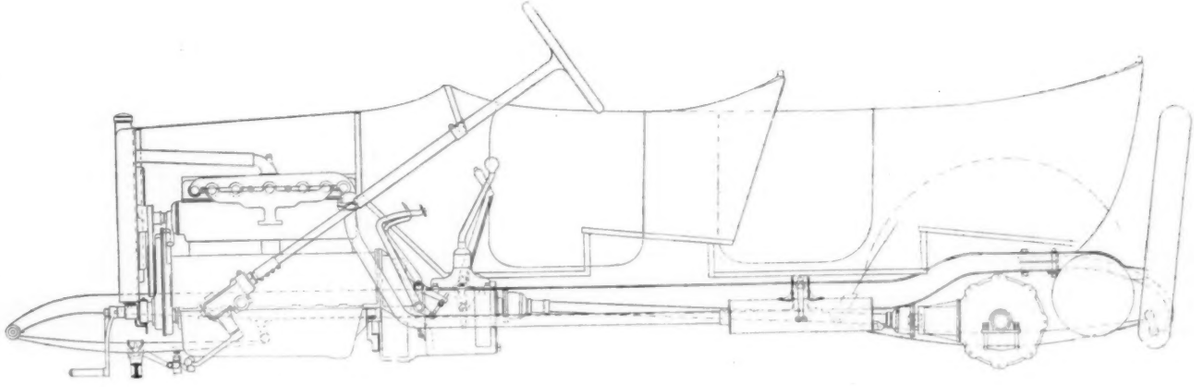
Hotchkiss Drive Employed

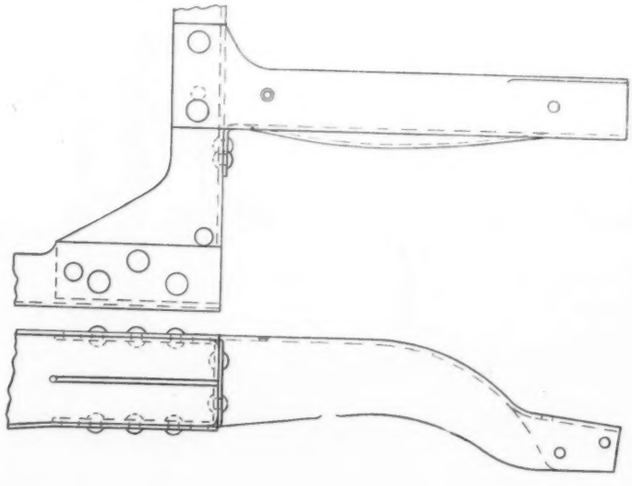
Back of the engine, the drive has been worked out as simply as possible, due to the Hotchkiss principle employed. Coming from the cone clutch with its ball bearing release shoe, and going through the gearset, the power next passes through the forward universal joint, then through the tubular shaft and rear universal joint to the rear axle. In the Hotchkiss type, the car propulsion and the torque are taken through the rear springs, the master leaves and the front shackle bolts of these springs being made strong enough to take care of these duties. This makes a very simple arrangement and is adaptable to cars of the weight of this Oakland in very nice shape. Torsion tubes, torsion arms and radius rods are entirely



Chassis of the new little six Oakland, showing lightness of construction and tapered frame







Oakland Little Six

For the first time the Oakland has a valve-in-the-head motor, this construction being used in its new block little six. Details of valve operation are illustrated in the section above as well as the construction of the cone clutch and three-speed gearbox.

The simplicity and neatness of design are brought out in the chassis outline which also gives an idea of the boat lines of the new body used on the Oakland little six. Note how the frame channel is split at the rear where it takes the end of the three-quarter elliptic spring. This is also illustrated in detail at the left. The steering column, it will be noted, is braced to the cowl. The line of the rear mudgards is dotted. Note the round fuel tank supported at the rear of the chassis frame. Provision is made for carrying spare tires as indicated

done away with, as will be evident from a study of the chassis view.

The rear springs are underslung. One very nice constructional detail is the method of attaching the upper portion of the three-quarter elliptic springs to the frame. The rear end of the side member is split so as to receive the spring end within it. Then a bolt goes through the frame end and the spring, and back of that a U-bolt is used. This is in contrast to the usual mounting of this part of a spring, it generally going below the frame, or in a bracket attached to the member. But by this new means of support, the rear end of the frame is lowered by an amount equal to the depth of the spring at this point—in this case 2 1-2 inches. Further, it gives a construction with fewer parts and is also extremely rigid. These advantages are aside from the niceties of assembly which are made possible. The tank mountings incorporate the tire carrier in unit and are shaped so as to fit the round form of the tank, bringing it up close to the rear member without needless overhang.

The Weston-Mott axle has a ratio of 4 1-4 to 1, and the design is the same as used on the model 38, the well-known Oakland small four. It is a one-bearing floating type with 12-inch brakes.

Also as in former Oakland design, the frame is so tapered that it follows, throughout its length, the body lines, thus giving good support all along. The depth is 4 1-2 inches, and no running board apron is used, the running boards extending in to meet the line of the body and frame. This is also used in previous Oakland design, and does away with one more or less unnecessary part. Fenders are heavily crowned.

In body work and fittings, the little six is well taken care of. The lines are very well worked out, with a good slope throughout, and a well-shaped cowl meeting the hood. The instrument board is metal-faced, and a distinctive touch is given by the turning over of the metal sides to make a rounded upper edge to the body. That is, the cushions do not extend out over the body edge.

Leather upholstery is featured. In the matter of equipment, everything is fitted that is generally regarded as a part of the up-to-date machine. There is a one-man top and tires are on demountable rims, with one extra rim.

New Boat Body on Hudson for 1916

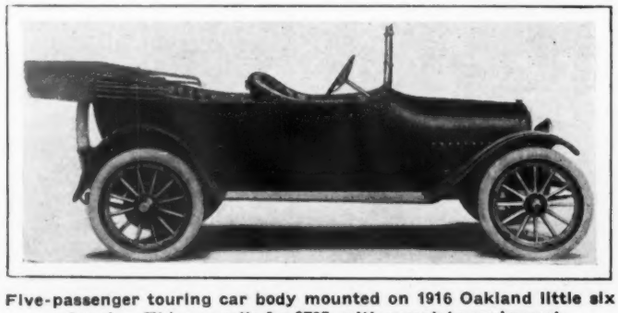
(*Continued from page* 1025)

bearings which are immersed in a bath of oil for lubrication.

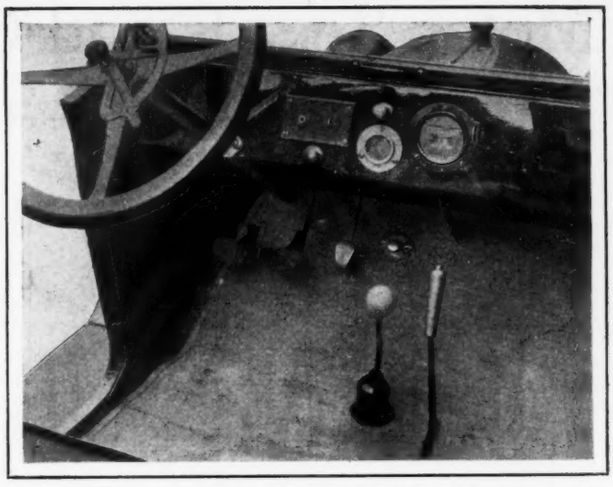
Spring suspension has been well worked out, with the rear springs 54 and the front pair 39 inches. Leaves are 2 inches wide, and they are assembled with graphite between them. The spring eyes are equipped with phosphor bronze bushings, and the maximum of grease cups are fitted.

Complete Equipment

The new Hudsons are completely fitted out, with one-man tops, dimming headlamps, Exide batteries under the front seat, trunk rack at the rear, speedometer driven from the drive shaft, electric horn with the button in the center of the steering wheel, carbureter air adjustment on the instrument board, and the other features more or less standard on the modern car. The color is a dark blue.



Five-passenger touring car body mounted on 1916 Oakland little six chassis. This car sells for $795, with complete equipment



Driver's compartment on the new Oakland little six, showing control members and the neat mounting of the gearshift and emergency brake levers

War Rushes French Plants

(*Continued from page* 1015)

bridges and strategic points. But if the pass cannot be produced when asked for, the car will not be allowed to advance another inch. As it takes on an average a week to get each pass, the automobile is the last mode of locomotion the private person considers.

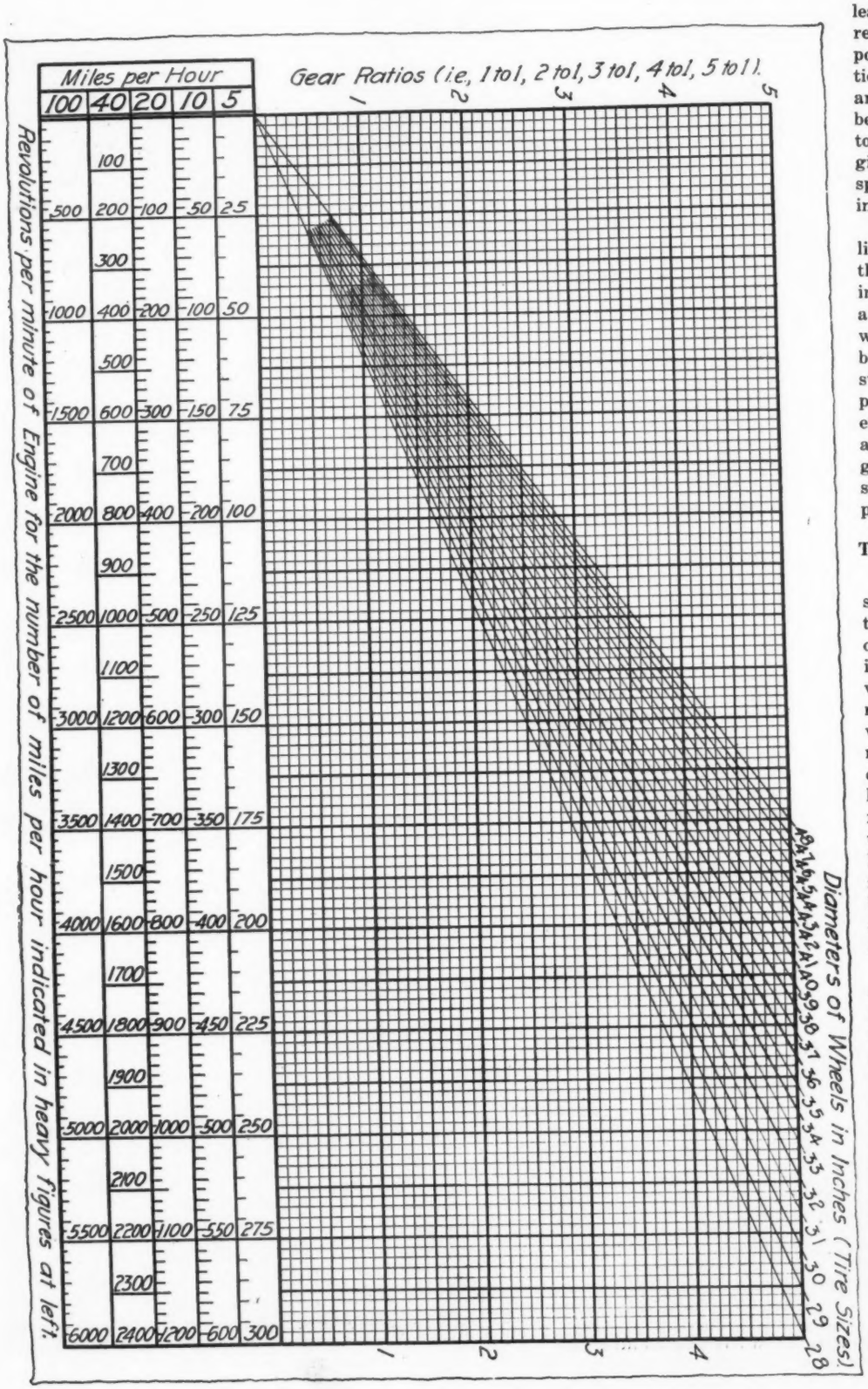
Gasoline Higher—Benzol Supply Cut Off

While there is no shortage of gasoline, and the price is but 2 or 3 cents a gallon higher than a year ago, the supply of benzol has been entirely cut off. This does not seriously affect the private motorist, but is a matter of considerable concern to taxicab drivers. Owing to its lower first cost, as well as to the fact that town duty is about 10 cents per gallon less than on gasoline, every taxicab driver uses benzol. The whole of the available supply of this fuel has been requisitioned for making explosives, thus forcing taxicab drivers to consume gasoline. The result is an increase in the running costs of $1 to $1.50 per day, this cost being borne entirely by the driver. The Paris General Omnibus Co., which is about to put 100 buses into service after a suspension of more than 9 months, is affected to a rather less degree. This company uses benzol but does not have to pay town duty on its fuel. It will now be obliged to burn gasoline.

The rubber situation appears to be very satisfactory from the standpoint of the army. Up to recently the tire factories in France were given monthly contracts and were allowed a sufficient number of men to deliver the goods. This has been changed, the army now placing definite orders from time to time. Indications are that the army possesses stocks of solid and pneumatic tires for a long period ahead and can maintain them without working the factories at more than a fraction of their strength. Orders have been placed for milimeter size tires to be fitted to American trucks as soon as the inch size tires need replacing. The French factory of the Goodrich company is doing much of this work. The disadvantage to the tire companies under these new conditions is that they have less guarantee that the men will be allowed to remain at work. Some annoyance is caused by the calling up of men of more than ordinary value to the factory, and when a new man has been trained there is no assurance that he may not receive notification to join the army.

Motor Speeds and Gear Ratios

A Diagram Which Facilitates Determination for Ratios Up to 5 to 1



WITH the coming of the high-speed engine there is a growing interest in gear ratios. Any statement of gear ratios taken alone is without meaning and any direct comparison of them is more than likely to be misleading. The diameter of the rear wheels is of equal importance, and the combination of the wheel diameter and gear ratio must always be considered. If one wishes to know the speed of the engine, another factor, the speed of the car, must enter into the calculation.

This calculation is not likely to be attempted by those without technical training, and being rather long and somewhat complicated, will not be undertaken even by an engineer except for strong reasons. The accompanying diagram gives the engine speeds at a glance for all sizes of wheels and all gear ratios up to 5 to 1 for several car speeds in miles per hour.

To Read the Chart

As an example of its use, suppose it is desired to find the engine crankshaft speed of a car equipped with 32-inch tires, gear ratio 3.8 to 1, which is being driven at 10 miles per hour. Follow downward on the sloping line marked 32 at the top of the chart until it intersects the horizontal line for the gear ratio of 3.8. The point of intersection is on a vertical line marked 400 in the horizontal scale for 10 miles per hour at the bottom of the chart. The engine is therefore running at 400 r.p.m.

There are also horizontal scales for car speeds of 5, 20, 40 and 100 miles per hour. In the above example the engine speeds corresponding to them would be 200, 800, 1,600 and 4,000 r.p.m. respectively.

Should it be desired to find the speed of the engine for 25 miles per hour, for example, the speed for 10 miles per hour may be multiplied by 2.5 or the speeds for 5 and 20 miles per hour may be added, giving 1,000 r.p.m.

Herewith is given a table of some engine speeds determined by the aid of the diagram.

S. A. E. Headquarters Well Laid Out

NEW YORK CITY, June 5—Now that the Society of Automobile Engineers has become settled in its new quarters in the Engineering Societies Building, at 29 West Thirty-ninth street, a great amount of interest attaches itself to the efficient layout of the suite of rooms in which the administrative end of the society is housed. Four rooms are used for handling the work of the society.

Entering the S. A. E. suite from the corridor on the sixth floor, one is led directly into the spacious general office, in which the clerical force of the society has its desks, filing systems, etc. This room, which is illustrated at 2, is centrally located, and from it one passes into the members' room to the right, shown at 1, and to the editorial room of the society publications to the left. The latter is illustrated in 4.

Passing through the members' room, another door leads into the council room, shown in 3, and between these two rooms is a folding partition which can be pushed back, throwing both rooms into one for use at Standards Committee meetings, etc.

The Rostrum

No Timing Is Most Efficient

EDITOR THE AUTOMOBILE:—Are there any rotary sleeve valves in use, and if so, will you give me a description of them?

2—What is considered the most efficient valve timing of a gas engine?

3—Where is the best place for the spark-plug in any type of engine?

4—Is there any reason why engine designers do not put the spark-plug over the center of the piston?

5—What is the best formula for figuring the proper size of a valve for a gas engine?

Trinidad, Col. W. H. ORTH.

—There are a large number of rotary sleeve valve motors in use throughout the world which have been described from time to time in the American and foreign automobile journals. Space does not permit here to go into a lengthy description. The Speedwell company used the Mead rotary valve motor as a regular part of the equipment of the car in their 1914 model. This was fully described in *Motor Age* for November 19, 1914. The Mead rotary valve is a double-valve design having two rotating sleeves, one for the intake and the other for the exhaust. The position of these sleeves at different parts of the cycle is shown in Fig. 3. These diagrams give an accurate idea of the functions of the double sleeve arrangement.

2—There is no such thing as the most efficient timing on a gas engine. The ideal timing for any two motors will not be the same. The reason for this is that the manifolds, piston displacement and various other factors have a marked influence on the proper timing.

3—The best place in the combustion space for a spark-plug is that the point of purest mixture. This will vary with different types of motor owing to the differences in shape in the combustion chamber. The reason for this is that where the charge is less diluted by unscavenged gases, it will burn quickest and surest.

4—In some designs engineers do put the spark-plug directly over the center of the piston. One example of this is the Moline-Knight engine.

5—The method for determining the proper size of the valve depends upon the gas velocity through the valve and the piston speed. Gas velocities are calculated on the basis of piston speed and a full opening of the valve. For the ordinary 45-degree poppet valve the gas passes through a space between two cones. The perpendicular distance between the two being one-half the valve lift times the square root of 2.

To express this in the terms of a formula, if h is the lift, and h′ is the normal distance between the two cones, formed by the valve and the valve seat, then $h' = \frac{h}{\sqrt{2}}$ when the angle of the valve is 45 degrees.

If the smallest diameter of the valve is D the gas will pass through a space equal to the area of a truncated cone whose side has a length h′ and whose small diameter is D and whose large diameter is D + h. The mean diameter of this truncated cone is equal to the sum of the small and large diameters divided by 2 or $D + \frac{h}{2}$. The area of the opening is equal to

$$\pi\left(D + \frac{h}{2}\right)h'$$

or, in terms of the lift h, $\frac{2\pi Dh + h^2}{2\sqrt{2}}$

This formula holds true for any valve in which the distance h′ does not equal the face width of the seat. If S′ is the velocity of the piston in feet per second, the proportion of piston speed S′ to gas velocity V_g for an engine of bored in inches, is therefore as follows:

$$\frac{S'}{V_g} = 2.84\,\frac{D\,h}{d^2} + 1.4\,\frac{h^2}{d^2}$$

This will give you the proportion you desire.

If you give any of the variables in this last equation the proper value and substitute for the constants such as the bore, valve lift, and valve diameter, the proper values, the theoretical valve proportions will be given.

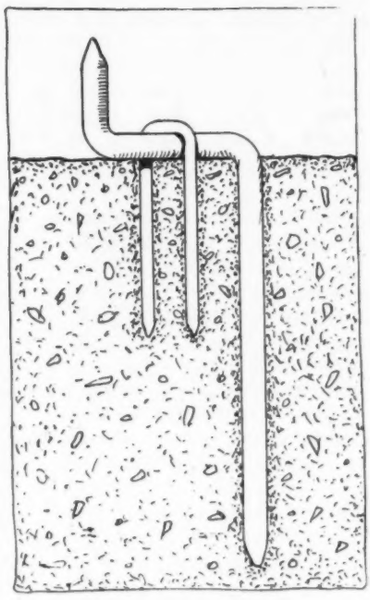


Fig. 1—Stake trap used by road vandals to puncture tires

Stake Trap for Automobilists

Editor THE AUTOMOBILE:—A new method of inflicting trouble on the motorist was invented by a French half-breed some 26 miles from Winnipeg. The instrument made and used is shown in the accompanying illustration and proved extremely effective in bringing the passing cars to a stop. Unfortunately for the culprit, one of the victims hunted over the road with a light to find what had caused the trouble to his tires and found the contrivance sticking up in the rut. On his arrival in Winnipeg the matter was reported to the Winnipeg Automobile Club and an immediate investigation was made which resulted in the arrest and conviction of the offender resulting in his having time to spend in jail and regret the time that he spiked a motorist.

Winnipeg, Man. A. C. EMMETT.

Wheelbase of Racers Shorter

Editor THE AUTOMOBILE:—Would you kindly inform me if racing practice has followed along the lines of touring car practice in the matter of lengthening the wheelbases of the cars? I am referring particularly to the cars used in the Indianapolis races during the past 4 years.

2—Was the Knight type of motor which was entered in the race, but which did not qualify, a high-speed design, and was its exterior appearance similar to other Knight motors? I am referring to the design known as the F. R. P.

New York City. J. E. S.

—The wheelbases of the Indianapolis cars, as has been pointed out in THE AUTOMOBILE, have become steadily shorter. Taking the average of the three leading cars for the years of 1911, 1912, 1913 and 1914, it will be noted that they have

steadily become shorter. Referring to the diagram, Fig. 2, the proportion of decrease will be noted.

2—The Knight design, known as the F. R. P., which was entered for the Indianapolis race, was distinctively a high-speed type, as will be noted from the horsepower curve shown in Fig. 5. According to this curve, the maximum horsepower was attained at somewhere about 4,000 r.p.m., at which time the motor developed over 120 horsepower. The exterior appearance of all Knight motors differs, some being block cast and others singly cast as in this instance. The Knight engine in the F. R. P. cars is shown in Fig. 4.

Horsepower by the S. A. E. Formula

Editor THE AUTOMOBILE:—Can you kindly inform me as to the horsepower of a six-cylinder automobile engine, 3 3-4-inch bore by 5-inch stroke as figured by the S. A. E. formula?

Medical Lake, Wash. A. S. O., JR.

—A six-cylinder motor of the dimensions you give will have an S. A. E. horsepower of 33.75.

Seamless Steel Tubing for Shaft Repair

Editor THE AUTOMOBILE:—I have a Buick model 17 which I am rebuilding into a truck. After the body is cut off behind the front seat the frame is too short so I thought I would get a longer frame to make the wheelbase 3 feet longer. What would be the best way to lengthen the driveshaft from the transmission 3 feet?

2—What is a good flux for welding aluminum by the oxy-acetylene process?

Earlham, Iowa. GEO. PHILLIPS.

—If you intend to carry the rear axle back a distance of 3 feet the best method of lengthening the driveshaft would be to cut it somewhere in its length and drive a piece of seamless steel tubing over each end of the shaft a distance of 6 inches or more. The tubing can then be brazed or welded to the shaft and a good connection made between the two. It must be remembered that in lengthening the wheelbase of a car it throws the entire steering layout out of arrangement, and as a result of this you will find a tendency of the car to skid. The center lines of the hub of the two front wheels must intersect the line of the rear axle produced at a common point and this will not occur if you carry the rear axle back in its original position.

2—It makes a great difference whether you are welding sheet aluminum or cast aluminum what flux you should use. Zinc chloride is used quite frequently, but best satisfaction can be secured by purchasing from the large welding concerns the proper flux. These are secret formulas which have been worked out by the chemists of these concerns and while you will have to pay a little more for them, the better results justify their use.

Chloride of Zinc Used as Aluminum Flux

Editor THE AUTOMOBILE:—Can you give me a formula for a solution to be used in soldering aluminum as muriatic acid is with sheet iron? I wish to use a copper and common solder with a little aluminum added.

Millersburg, O. B. L.

—The flux generally used with aluminum is chloride of zinc, but with the solder you speak of this might not prove to be the best.

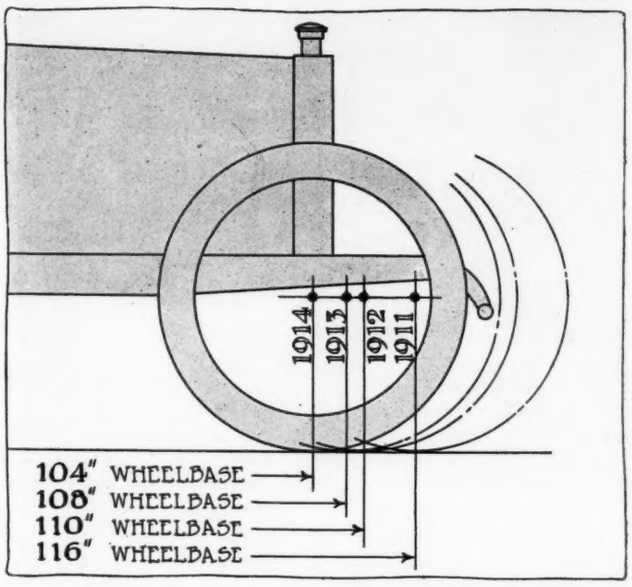


Fig. 2—Diagram showing average wheelbase of first three cars to finish the Indianapolis race in 1911, 1912, 1913 and 1914

Experimenting on Boron for Resistance

Editor THE AUTOMOBILE:—I would like to ask you if there are any boron cutouts or current regulators used in the electrical equipments of automobiles?

Denmark, Wis. A. W. BROBERG, M. D.

—The use of the element boron for cutouts and regulators for electrical apparatus, has been tried out by different concerns and in fact many are conducting experiments at the present time, but it has not yet proven satisfactory. The quality of boron in having the resistance increase with its temperature due to the passing of an electrical current through it, would seem to make it ideal for use in regulators; especially since it has a fixed point at which the current does not further increase. It seems to be short-circuited upon itself and holds the current at a steady voltage.

However, the disadvantages have proven so many, that as yet no satisfactory use has been made of the boron.

Magnets Probably Have Become Demagnetized

Editor THE AUTOMOBILE:—Will you kindly inform me through THE AUTOMOBILE regarding the following:

I have a Ford and have just installed a new magneto and

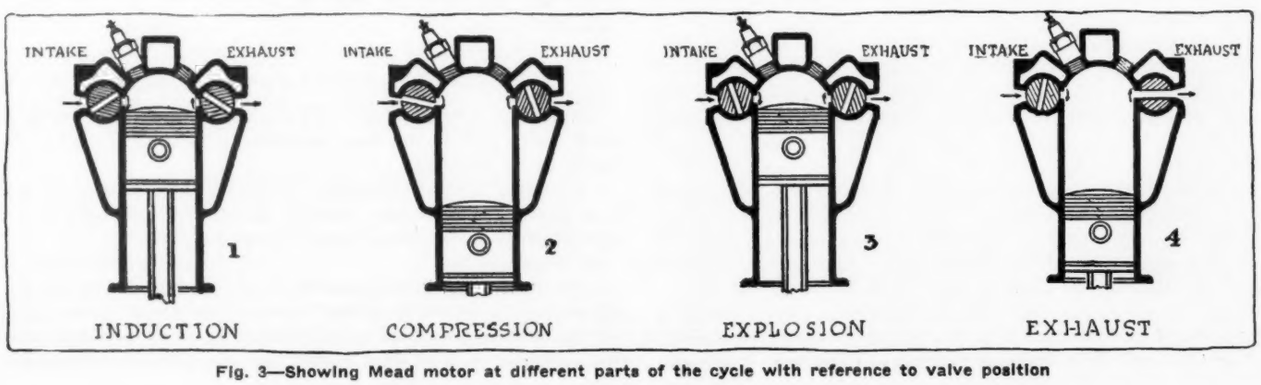


Fig. 3—Showing Mead motor at different parts of the cycle with reference to valve position

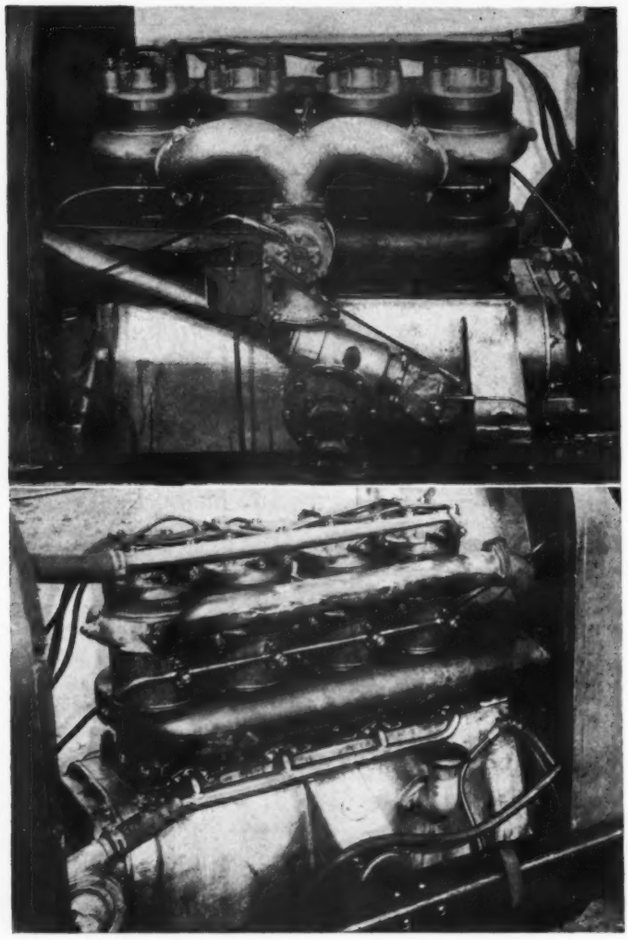


Fig. 4—Intake and exhaust side of the Porter-Knight motor, showing manifold and cylinder construction

tested magneto coils and find all O. K., but the magneto will generate only 3 1-2 volts which will not run the motor. I tested direct from magneto and know that the magneto plug is all right. It will not generate enough to light one 6-volt 12-candle power lamp.

Honeoye, N. Y. H. M. PATTERSON.

—If you are sure that all the wiring and connections are correct, it is probably due to the fact that the magnets have become demagnetized, that the magneto will not operate. The magnets should be tested and if they are weak, should be charged.

Origin of the Cantilever Spring

Editor THE AUTOMOBILE:—When was the cantilever spring first used and on what car?

2—Please name the next few cars to employ this construction, naming them in order of adoption?

3—Name the various types of axle suspensions and drives used, and give one or more representative cars using each design.

Chicago, Ill. G. S. C.

—The cantilever spring was first used on the Lanchester car made by the Lanchester Motor Co., Birmingham, Eng. While it may possibly have been used on experimental vehicles previously, there was no doubt that the Lanchester was the first car to which it was fitted as stock design.

2—It is not quite clear who was the next one to adopt it after the Lanchester as it was used by a variety of makers of small cars. The Daimler company, Coventry, Eng., and the Rolls-Royce company, Derby, Eng., also adopted it at the same time. It has been used in France by several makers and now has been adopted by the Wolseley company, Birmingham, England.

3—It is not quite clear what you mean by axle suspension. There are only two ways of attaching an axle, one being above and the other beneath the springs. Both are very common practice in America and are used in various combinations with different methods of drive. For instance, in the Hotchkiss drive, where all the drive and torque are taken through the springs, it is practically universal practice to mount the axle under the springs and in the various modifications of the Hotchkiss drive where supplementary torque stays, etc., are used, the axle is generally over the spring. On cars where the torque and drive is taken by various kinds of tubular arrangements, the axle is found over and under the springs in representative cars. Cars which drive through the springs, such as the Franklin, Hudson, and Hupmobile and a large number of other representative American designs generally have the axle under the springs, but it has become a growing practice to undersling the three-quarter elliptic. There are three main features to be considered in arranging the drive and a practically unlimited variation is made in the detail arrangements for handling drive, torque and radius action. The method of taking the drive in all the American cars was listed in THE AUTOMOBILE specifications published December 31, 1914.

Adjustment of Main Bearings

Editor THE AUTOMOBILE:—How many miles should a Paige 36 run before the engine main bearings need adjustment?

2—What per cent. of grade, paved with asphalt should the Paige 36 which weighs 3,600 pounds with passengers, be able to climb on high?

Santa Barbara, Cal. E. F.

—You should be able to run the car an average of 10,000 miles before the main bearings need adjustment, but if you have driven improperly with spark advanced too far, for instance, or attempted to take every hill on high gear and do various other things with the car which put extra strain on the crankshaft and bearings, it will sometimes happen that a set of bearings will wear out in 2,000 miles.

2—The Paige should be able to take a short hill of 12 per cent. on high gear, but on a long hill a 7 or 8 per cent. grade would be the maximum.

Parts Wanted for 1911 Warren Car

Editor THE AUTOMOBILE:—Where can I get a set of cylinders for a 1911 Warren-Detroit car?

Jersey City, N. J. DAVID PATTERSON.

—Parts for the Warren car can be secured from the Puritan Machine Co., Detroit, Mich. In writing for parts of the car you should mention the serial model number in order that you will be sure of securing the proper part numbers.

Wants to Install Starter on Moline

Editor THE AUTOMOBILE:—What starter would you recommend which will do the work and can be installed on a 1912 Model M 35 Moline?

I have had several customers for this but up to date have been unable to find one. Would appreciate drawings and any information you may have at your disposal.

Mt. Sterling, Ill. AUTO SERVICE STATION.

—To install an electric starter on this car means a great expense, as machine work and special parts are necessary. The Moline company has installed Ward Leonard systems on two or three cars of this model and the work necessitates

a new crankcase bottom, new brackets and a new flywheel. It is this system that has been recommended by the Moline company whenever inquiries have been made to them. On the other hand, several instances are noted where the Crescent air starter has been installed very reasonably and it is stated that it operated satisfactorily. With the air starter, the work necessary in making the installation is not as great, but should an electric be desired by the fitting of the parts mentioned a satisfactory job could be made. It must be remembered that the cost is so high that, according to men who have had this work put through, it would pay the owners to sell their cars and purchase up-to-date models.

Tire Pressure Same Throughout Tire

Editor THE AUTOMOBILE:—Kindly give me the following information, all questions referring to a 34 by 4 tire, car weighing 3,000 pounds and the rear tire having a direct load of 800 pounds:

When an inflated tire is in a stationary position at which point is the highest pressure?

2—How much more pressure is at this point than at a point directly opposite?

3—Outline mathematics necessary for working out the result.

4—When a car is traveling 20 miles an hour with what force does the tire strike an object?

5—Is it true that the air inside of the tire travels in a direction opposite to that of the tire?

Detroit, Mich. J. M. KEARNEY.

—The pressure is the same throughout the tire. It is one of the fundamental physical properties of gases that when a mass of gas is inclosed in a vessel, it exerts a uniform pressure against every square inch of the surface of the vessel, and also that at any point in the fluid mass the pressure is the same in every direction. Were this not so, the gases in the tire would not be in a state of equilibrium and hence, although the tire was stationary, the gases would be under constant motion as the part having higher pressure would tend to flow toward that having a lower pressure.

2—This is answered under question 1.

3—There is no mathematics necessary in arriving at this conclusion.

4—When a car is traveling at 20 miles an hour the force of its impact against a stationary body depends upon the weight of the car. There is no direct answer to the question: "With what force does a moving body strike?" The energy contained in a moving body cannot be expressed in pounds simply, but only in foot-pounds, which is the product of the mass into one-half the square of the velocity. Thus, if a car is traveling at 20 miles per hour, or 29.3 feet per second, the energy contained in that car is equal to $\frac{W\ v^2}{2g}$: where W is the weight of the car, v the velocity in feet per second, and g the acceleration due to gravity. For the particular case you mention, the energy contained in the car is 13.34W foot-pounds. For 2,000-pound car the energy would be 26,680 pounds through a distance of 1 foot or the pounds and feet may be divided in any way so that their product equals 26,680.

5—It is not true that the air inside the tire travels in a direction opposite to that of the tire. It travels with it.

Dead Axle Requires Chain Drive

Editor THE AUTOMOBILE:—What is a live axle?

2—What is its advantage over the other types of axle?

Rutherford, N. J. C. M. DANIEL.

—A live axle is one which is a part in the transmission of power and hence is in motion during the time the power is transmitted. It is the opposite of a dead axle which merely has the function of carrying the wheels and which does not revolve with them. With a dead axle, it is necessary to get the power back to the wheels by means of chains, whereas, with the live axle, the more silent shaft drive can be used.

American Used Teetor Motors

Editor THE AUTOMOBILE:—Kindly advise me by mail who made the motor that was used in the 1912 American Tourist underslung car?

Jersey City, N. J. A. H. KOPETSCHNY.

—Some of the motors used by the American company were of the concern's own manufacture but in the particular car you mention they were made by the Teetor company. This is now the Teetor-Hartley Motor Co., Hagerstown, Ind.

Fan Dynamometer Is Fairly Accurate

Editor THE AUTOMOBILE:—I have a motor in Maine, the power of which I wish to determine without sending it here to be tested. I find I can purchase an air fan with the paddles arranged so that they can be moved in and out, thereby allowing the motor to run at varying speeds. The power can then be determined according to a test formula which shows that with the air paddles in certain positions and the motor running at a certain number of revolutions so much power is developed. Is such a device accurate or reasonably accurate? If so, is it the most simple and least expensive means I can employ?

New York City. WILLARD WADSWORTH.

—The fan dynamometer is the simplest type of brake horsepower measuring outfit which you can secure and is fairly accurate.

Burman Made Fastest Time in 1911

Editor THE AUTOMOBILE:—Can you possibly tell me what is the greatest speed ever attained by a motor car? Also, where and by whom?

Waltham, Mass. HENRY M. STANLEY.

—The fastest time of which any recognized record is held in an automobile is that made by Bob Burman at Daytona Beach on April 23, 1911, when he made 1 mile in 25.40 seconds in a Blitzen-Benz.

Porter-Knight Develops 122 Horsepower

Editor THE AUTOMOBILE:—Will you kindly publish the maximum horsepower developed by the Porter-Knight racing car which was entered in the Indianapolis Race. If possible I would also like to see the motor illustrated.

Detroit, Mich. B. H. S.

—The horsepower curve of the F. R. P. Knight motor is shown in Fig. 5 on this page. It will be noted that the curve extends above the 122 horsepower mark at a speed of about 4,000 r.p.m. Exterior views of the motor are shown in Fig. 4.

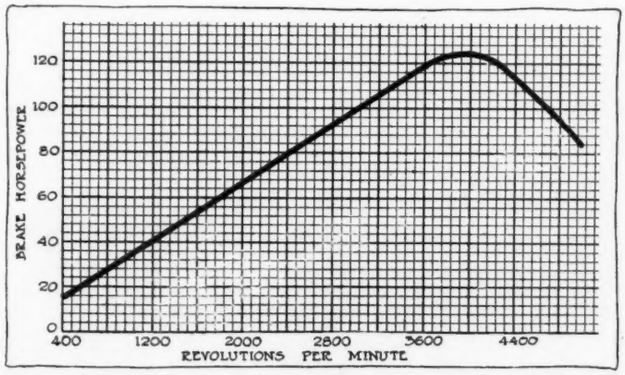


Fig. 5—Horsepower speed curve of the Porter-Knight high-speed motor

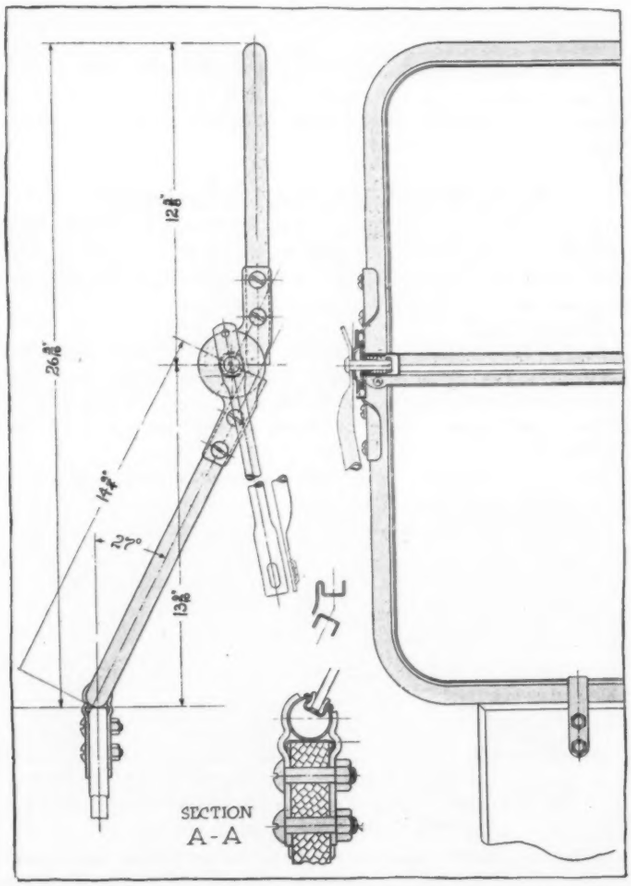
ACCESSORIES

Dyneto for Fords

A NEW single-unit starting and lighting system for Ford cars has been brought out by the Dyneto Electric Co. The motor generator is practically the same as that which has been furnished for the Franklin and throughout the entire electrical design is similar to the larger models of motor generator. The windings are such as to prevent overcharging of the battery by limiting the output to within the maximum charging rate. This is accomplished without the use of any external regulators.

The motor generator is attached to the car by means of a carefully designed bracket which holds the equipment firmly to the motor. The method of installation is so simple that, according to the manufacturer, anyone can install it in approximately 3 hours. No drilling or machine work is required. The outfit comprises the motor generator, storage battery, starting switch and a complete outfit for the mounting and driving of the unit. The Dyneto is installed on the left of the engine with its shaft forward so that a chain drive can be used directly from the Dyneto shaft to the crankshaft. No extra chains or gears are required. The wires are all cut to length and numbered so that by carefully following directions any layman can make the installation. The battery is a 12-volt Willard inclosed in a pressed steel running board box complete with bolts for mounting.

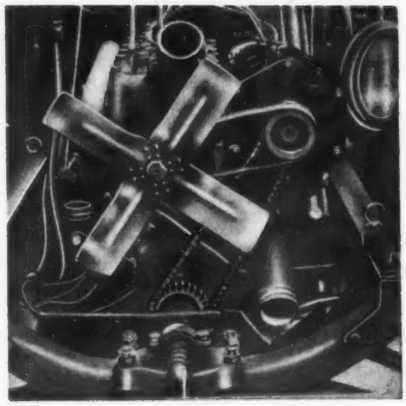
Besides the starting switch, an ignition switch is also furnished and the regular ignition switch on the coil box can be discarded. In starting it is only necessary to move the switch to the extreme right position and allow it to stay there. When in this position, the motor generator is acting as a motor at the lower car speeds and as a generator at the higher speeds. The machine begins to charge the battery at a little less than 10 miles per hour, delivers its maximum of from 10 to 11 amperes between 15 and 20 miles per hour and drops to about 6 or 8 amperes at higher speeds. The complete outfit, including full instructions, sells for $75.—Dyneto Electric Co., Syracuse, N. Y.



Details of Diamond windshield for Fords with sectional views

High Speed Hand

The manufacturer of the Corbin-Brown speedometer has incorporated in this branch of its product an improvement which it expects to be of great service to automobilists and motorcyclists but particularly to owners and operators of commercial vehicles. This improvement consists of an individual maximum speed hand as shown in the accompanying illustration. This hand is colored red and is entirely distinct from the regular speed indicator, being locked to the trip odometer in such a manner as to render it impossible for anyone to reset it at zero unless provided with the key. As the name implies this hand registers the highest speed made during the day or trip and remains at that point until unlocked.—Corbin Screw Corp., New Britain, Conn.



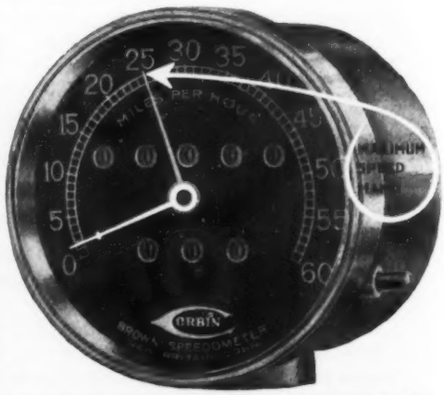
The new Dyneto electric starting and lighting system for Ford cars

Windshield for Fords

Specially adaptable to the Ford as now made, is the Diamond windshield. This shield is of the black enameled tubing type and has two glass parts, as illustrated herewith. As attached to the Ford the lower glass is tilted inward at an angle of 27 degrees, there being supports running from the pivot point for the upper glass to the sides of the body. The upper glass may be swung into any position around its base pivot. The width of the shield is 42 3-8 inches, and the height (with the lower glass at an angle) 26 3-16 inches.—Diamond Mfg. Co., Detroit, Mich.

Gaso-Tonic for Fuel

Gaso-Tonic is a motor power fluid which is claimed to increase power and mileage from 25 to 50 per cent. when 1 ounce of it is poured into 5 gallons of gasoline. The maker states that the use of the fluid removes carbon from the cylinders and that there is no acid or other ingredient in the preparation which could injure the motor.—White Mfg. Co., Cincinnati, O.



Corbin-Brown speedometer incorporating the new maximum speed hand

Resilience No True Gauge for Tire Efficiency and Efficiency No Measure of Needs

A Discourse Based on Contrary Views in Letter by Mr. Duryea

By M. C. K.

CURRENT opinions on a subject such as that of automobile tires, with regard to which those interested have ample opportunity to gather experience, may be expected to contain some truth if not all of it. Yet the letter reproduced herewith, from Charles E. Duryea, the well known pioneer builder of light automobiles, relates that most people want tires to be thick, so as to resist puncture, but that he, after 25 years of experience and study, wants them to be thin and as resilient as possible. He also expands this view so as to make it include other tires than air tires, and claims that these, too, should be as resilient as possible. Mr. Duryea's views are no doubt entertained by a great many others, being followed quite widely in tire-manufacturing practice, so far as cushion tires and solid rubber tires are concerned, and they have a large following also for air tires, obscured only by the demand for knobby treads and the fear of punctures. They are therefore entitled to be spread on the records, but, as they point in the wrong direction for progress, the partially dissenting opinion of the writer is registered at the same time. The situation seems to be similar to that which gave the United States very bad coffee to drink for many, many years. It was the current opinion that good coffee should be hot, and the popular inference was that hot coffee was good. The result was that coffee was always piping hot—sometimes superheated, in fact—and all effort for improving its quality in a more rational manner went by the board. With regard to tires, the observation that tires which are good—meaning in most cases only those which win races or give large mileage for a given expenditure of power—are highly resilient has been followed by the fallacious inference that the most resilient tires are the best. This inference would lead inventors and manufacturers to seek for improvement in the direction of resiliency.

The remarks referred to in the opening passages of Mr. Duryea's letter are the following, which appeared in THE AUTOMOBILE of May 20, page 903.

"Certain tires," D. says, "will give 25 per cent. more mileage per gallon of fuel than others BECAUSE they are more resilient . . ." The BECAUSE seems arbitrary, even if the tires referred to are in fact more resilient. The reason for saving power by using them might be that their resistance to flexion is smaller, and not that they extend with nearly the same force that is spent in flexing them. It is possible to imagine a tire flexing with small resistance yet resuming its shape slowly.

Mr. D. seems to believe that the power absorbed in flexion is returned by a resilient tire in form of help for the propulsion, but the saving effected is really due to the smaller acceleration of masses which the tire flexing with small resistance makes possible; the vehicle body, for example, is moved less, and less rapidly. But the extension of the tire to its normal shape returns no power in a useful manner. This objection also covers Mr. D.'s rapid conclusion from his racing experience in 1896. The flat tire had to be flexed all the way round, yet saved no load lift or acceleration.

Duryea's Argument for Resiliency

Editor THE AUTOMOBILE:—I have read and re-read your exception to my expressions concerning the reason why some tires require less power to propel them and their load than others. Whatever you mean, I cannot allow it to pass unchallenged. I have been through this subject too often in the last 25 years to not have arrived at a conclusion that will take more than mere assertions to dislodge.

We seem to differ in our conceptions of the tire structure. I cannot imagine any reasonable tire structure that would not be equally flexible each way. If it yields easily to pressure from the outside it will yield easily to pressure from the inside. Or in other words if it is an air tire instead of a stiff fabric tube it will absorb the pebble and not lift the load. This seems to be what you mean by "smaller acceleration of masses." This swallowing of the small inequalities is the reason for the air tire. It smooths the road and on most road surfaces requires less power than a solid tire which does not have this action. I think we agree thus far.

I can of course imagine a tire having many dash pot plungers attached to the inside of its tread and arranged to compress easily but restrained from regaining its proper shape by the slow action of the dash pot plungers. The point between us seems to be this: that you believe such a tire would propel just as easily as the usual air tire, which pushes against the ground as it leaves it almost as forcibly as it pushes against the ground where and when it meets it. I am sure that it would not. So long as both of these tires were standing, the pressure behind and before the center of contact would be the same. But roll them and the slow one has much resistance to compression ahead of contact and no assistance to propulsion behind. The perfect air tire has as much help from behind as it has resistance in front. This is stating the theoretic extremes. Of course any tire that resumes its former shape will get some propulsion assistance from that resumption tendency unless mechanically restrained from resuming its shape till it no longer touches the ground. The slower the wheel movement the greater the amount of power returned to the wheel. The faster the wheel motion the greater the loss due to this compression and slow expansion of even the air tires, but since at higher speeds the air tire smooths the road and saves other losses we use them and find them valuable.

One more shot. In the imagined dash pot tire the work of compression would heat up the dash pots by the friction of the slowly returning plungers. In other words the heat of the work of compression would be found in the dash pot liquid. But in the tire which I claim kicks the wheel ahead where does the work put into the tire by the compression go to? I claim it expends itself by pushing against the ground, less of course such slight heat as the flexion of the fabric causes. The dash pot tire would have that fabric heat also. I trust this makes it plain that "the extension of the tire to its normal shape" does return "power in a useful manner." This matter is easily proved by running the different tires on a floor or similar smooth surface where there is nothing to cause the wheels and axles to rise or fall. No "acceleration of masses" unless the small amount of tire tread disturbed be considered a "mass." Tires to be inflated to carry the load alike, i.e., with the same degree of flattening. The stiff tire containing much fabric will require far more power to roll the wheel than is required by a tire that has a very thin fabric and carries its load on air, which is perfectly elastic, rather than on fabric which is very inelastic. Our resiliometers used in the cycle days showed differences of as much as 25 per cent. and it is likely that there is a greater difference in auto tires. Electric car makers ought to be able to give us the facts in this matter. They know by actual miles driven that one tire will use many per cent. more power than another.

The recent economy tests of the Franklin cars showed that

the cars which made the larger mileages were mostly equipped with "cord" tires. The advantage of the cord tire is its greater flexibility. Flattening a tire at its point of contact absorbs a certain amount of power. Part of this is lost in the friction of bending the tire structure but most of it is available for work. Part of this work is done in restoring the fabric to its normal shape and the remainder is expended in pushing the wheel ahead and helping to overcome the resistance of the original compression. We should all work to see that this latter part is as large as may reasonably be.

So long as the auto was "the plaything of the rich" the matter of economy did not enter, but now that it is each day becoming more the necessity of the poor and extending to our daily work we should give prominence to those things which make for economy. Most buyers need education on this tire matter. They give no thought to tires except to hope they are so thick they cannot be punctured. They do not know that a thick tire must be kept inflated so hard that it will not properly smooth the road or else it will quickly break its fabric, whereas a thin one can do its duty and still have long life because a thin piece of anything will bend more times than a thick one, before breaking.

Philadelphia, May 21, 1915. CHAS. E. DURYEA.

Even the gold nugget at the end of Mr. D.'s letter, to the effect that a tire with thin and flexible fabric can be used with lower inflation than it is necessary to employ for a stiffer tire to avoid expense, cannot be accepted at 24 karats, as practice shows that thickening of the tread at intervals by means of rubber-compound knobs projecting from a flexible casing produces easy riding with moderately hard inflation, the knobs serving to localize the flexions caused by inequalities of the road and the flexible fabric between them easing these flexions, while some of the inequalities are taken up in the intervals between the knobs. In conjunction with very flexible side walls for the tire, which reduce the need of flexion at the tread, this compromise-construction probably serves comfort, economy and convenience (protection against punctures) more acceptably than the tire casing which is thin and flexible throughout can do, at least on hard roads. On soft country roads, where the inequalities are mainly in the form of waves and depressions, it is the quality of the spring suspension, rather than the tires, which counts for comfort and protection, the needed tire flexions being no more abrupt than may be properly demanded of any air tire.

Two Properties Confounded

Reverting to Mr. D.'s main argument, which runs to the effect that resiliency is the secret of tire efficiency, but lapses in spots (as where cord tires are mentioned) to the admission that it is flexibility which saves power, it seems that he considers these two properties identical because they are so closely associated in air tires, and perhaps he overlooks for the moment that an air tire, besides absorbing road obstacles by local flexion also acts as a spring, flattening out against an elastic resistance, much as any other kind of spring does. In so far as this plain spring action, which comes into play, for example, at any gradual rise in the road, is needed to help out vehicle springs which are too stiff, it is evident that it assists in reducing power consumption just as more flexible vehicle springs would do, and if this action in practice depends upon the resiliency of the air, it is not far off to maintain that the resiliency makes for tire efficiency—only it would be more correct and to the point to insist that the tire flexion assists the spring suspension to save power.

If 50 per cent. of the resistance to such flexion took the form of friction—the friction of air passing through the capillary openings of a spongy structure, for example—the assistance to the spring suspension would remain the same and the flexibility would be the same as before, but the resiliency would be much reduced and the tire would not rebound at once. The rebound would not throw the axle upward, because, even at slow speed, it would not act till after the road formation causing the spring action was passed and would then take effect to restore the tire to its original shape. Theoretically such a tire would be an improvement over any existing air tire, when only the action and not the weight is considered, giving the same effect for all speeds that is now obtained from air tires only for the high speed, but it is probably true that it would be extraordinarily difficult to produce a tire of this character which would be durable and light and in which the flexibility would be equal to that of a standard air tire with a thin and flexible casing. In comparison with cushion tires and solid rubber tires the possibilities look different, however, the theoretical fact remaining, after the speculation has been dismissed so far as any immediate or practical influence on the construction of air tires is concerned, that a resiliency which takes effect directly from the road obstacle, and causes bouncing of the running-gear and of the vehicle as a whole, is undesirable for any type of tire, whether it is unavoidable in air tires or not. Cushion and solid tires have not the plastic flexibility to wrap themselves around small road obstacles, but have so much resiliency as to make them bounce, and it is entirely pertinent to the question of their improvement to make it clear that it is not their resiliency which should be increased but their flexibility, if possible and consistent with other requirements.

Source of Air Tire Efficiency

Mr. D. apparently does not remember that this idea was advanced in the first place with reference to tires of this general type and not with reference to air tires, to which it applies in the abstract, however, with equal correctness, notwithstanding that it may be difficult to "imagine any reasonable [air] tire structure that would not be equally flexible each way." (It would be too captious here to remark that an air tire has just that quality when the casing is not deformed.)

The efficiency of air tires as power savers is probably due mostly to the fact that the compression of the air caused by the load remains constant on smooth roads and consumes no power, the air being merely chased around slowly as flexion of the fabric advances from one point of the casing to the next, while in tires of other kinds all the elastic material must be flexed successively as the wheel revolves. It is especially worth noting that this advantage of the air tire holds good whether the inflation is high or low. In all cases only the flexion of the fabric makes demands upon the power, except when shocks are received. Comparison between air tires and solid tires in this respect points perhaps to a reduction of both resilience and flexibility in heavy duty tires in conjunction with a superior development of flexibility in the spring suspenson.

Interaction with Springs Neglected

Referring again to the spring action of the air tire in connection with a vehicle whose leaf springs are too stiff and the advantages in the way of reduced power consumption which may be recorded if the tires are highly resilient, there seems to be occasion for calling attention to two slips in the reasoning. One consists in ascribing the advantage to the resiliency alone when other properties, notably flexibility, are also involved. The other one lies in failing to record the flexibility of the springs with which the tires co-operate, since it is more than probable that the same tires which show superiority in connection with stiff springs would show an inferior efficiency, as power savers, in connection with more flexible springs. The road condition should, of course, also be recorded, since it is an established fact that hard and rigid steel tires give the smallest traction resistance on a perfectly smooth and dry road. In whatever manner power consumption records are established, they are almost valueless for ascertaining tire re-

quirements unless they are completely co-ordinated with records of the loads, the properties of the vehicle springs and of the roads.

To have the spring equipment the same for all tests is not sufficient. There must be different springs, different loads for each set of springs and different road conditions for each combination of springs, loads and tires. Speed variations must further multiply such tests to make them scientifically acceptable.

It is simpler to go a little farther and deeper with reasoning alone and begin testing only when the logic begins to totter.

Various Distinctions

If the "mere assertions" to which Mr. D. refers are these: "That flexibility is another property than resiliency" and "that springs reduce acceleration of mass," by either transforming a shock into movement or a sudden movement into a slower one, there is, for brevity's sake, nothing to be said. They will have to stand—as 2 x 2 make 4—till more definitely contested. The elastic tire saves shock, kinetic energy, work, power, not only by absorbing the pebble, but also by its other spring action. It has to have resiliency in order to regain its shape after flexion and because resiliency is the most practicable property by which the resistance to flexion can be increased somewhat in proportion with its degree; otherwise flexibility would be sufficient—a flexibility operating with an initial resistance equal to the support of the load.

If a carpenter falls from a building and is saved by striking a board of the scaffolding, bending and breaking it, he gets the benefit of its flexibility while destroying its resilience; it does not rebound when broken.

Vehicle springs must be highly resilient in order to get back to work quickly (and to obviate fatigue of the steel), but the compressed portion of an elastic tire has a whole revolution of the wheel before it must be in shape again. It may be doubtful, therefore, how much elasticity and resiliency, which are not necessarily quite identical, are required of it.

In vehicle springs we sometimes reduce the resiliency by adding shock absorbers and save power by this modification. We especially moderate the rebound. We frankly throw away the power stored in the rebound, not knowing how to utilize it, except for returning the spring to its best position.

No Single Property Decisive

Not a single reason points to the need of perfect resiliency in a tire. Every reason points to the need of some resiliency coupled with the greatest practicable degree of flexibility in a tire. The limits of the flexibility are determined by (1) the need of supporting the load on smooth roads with a minimum of flexion and a minimum of power spent in flexion, (2) the limited dimensions at disposal and (3) the desirability of avoiding heating, wear and deterioration of tire material. The last consideration operates in favor of not giving the tire too much work to do but allowing it to transmit the larger portion of the spring work to the vehicle springs. The possibility of overloads also militates against gauging the flexibility so closely that large deformations of tire materials are apt to take place on smooth roads. Durability is here an intricate factor. But resilience, in needlessly repeating deformations, is against durability.

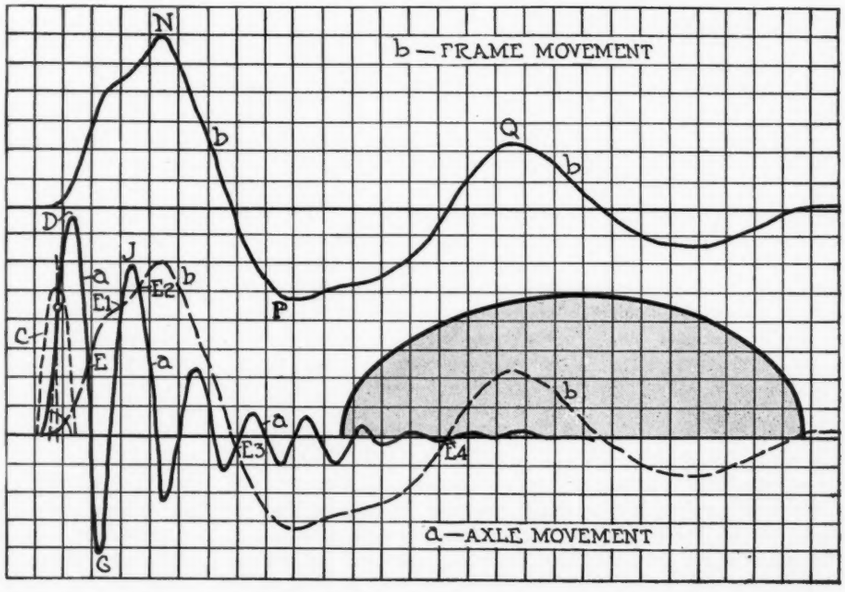
The aim of the tire constructor must be to reconcile these factors, but not blindly to produce the maximum of resiliency. Quite likely the use of materials which are highly resilient affords the readiest compromise solution, since none other has been devised; and air confined in flexible fabric has the enormous advantage that it yields to a pressure covering 1 square inch with a resistance only a percentage more than one-tenth of its resistance to a pressure covering 10 square inches. This property makes it absorb the small obstacle. But this advantage is abandoned in tires of other types, while the resiliency which causes undesirable reaction movements is conserved at the expense of desirable flexibility. Only Mr. D.'s argument to the effect that the resilient reactions are utilized for propulsion stands against aiming for reducing resiliency and increasing flexibility if possible, in airless tires.

The Back Thrust Theory

He claims the air pushes against the ground behind it as the tire rolls on. The resilient material in a solid or cushion tire should do the same, on the principle he advances.

The pressure-center of the push to which he refers would, with 4-inch length of ground contact area, be about 1 inch behind the axle plane, on level ground. The push is toward the axle. It has no effect to turn the wheel in either direction. The upward push is offset by the downward push, so there is no relief of ground pressure or driving-resistance. What does it do except expanding the tire to its full shape? In front of the wheel, on the other hand, there is the absolute work of flexing the fabric and compressing the air, but on smooth roads the compressing of the air by the load is constant, and only the work of flexing the fabric remains. This is completely lost. (If the tire is flat, as in the race to which Mr. D. referred in his first letter, the flexion is greater—much greater—the spring benefits are nil and the constant reshaping of the tire is also taken out of the power.)

Therefore, the flexibility of the fabric and the degree of inflation, which rules the amount of flexion work, determine air tire efficiency on smooth roads. Resiliency only reshapes the tire. This agrees perfectly with the statement by Mr. D. that "a stiff tire containing much fabric will require far



Automatic shock record, showing function of resilience with air tires at 14 miles per hour vehicle speed

more power to roll . . ." It certainly will, if the load is sufficient to flex it, despite its stiffness.

Cord Tires and Inflation

Superior flexibility in cord tires arises mainly from the inextensible cords preventing the traction resistance from deforming the fabric in the tangential direction, where the resistance to such deformation is great, yet smaller than the traction pull. In an underinflated tire this sort of deformation is at its worst, hence loss of power and rapid deterioration of fabric. Nevertheless, it is authentically established that soft tires give maximum comfort for slow to medium-fast driving on rough roads. Their flexibility is higher and their resiliency is lower than if the inflation were normal. The fact therefore serves as a reminder that resilience is a secondary factor for some of the purposes for which tires are employed, and also points to the futility of judging tires solely on a basis of their power efficiency.

Action Under Shock

If Mr. D. will glance at the accompanying illustration (reproduced from Fig. 9, page 197, of THE AUTOMOBILE, Jan. 28), which is an automatic record of axle and body movements taking place when a vehicle with properly inflated air tires and going at about 14 miles per hour, passes over an obstacle about 1 inch high and shaped as shown in the shaded space, he will observe that the axle is raised a little less than the height of the obstacle when over the middle of it (the letter C indicating the obstacle foreshortened to the horizontal scale of the diagram). The tire is only a trifle compressed. Its rebound therefore began taking effect while the wheel was still climbing and behind the obstacle. The resilience could therefore under no circumstances, at this moderate speed, act to turn or push the wheel in any useful direction.

It throws the axle into the air; and that is just the objection to the unrestricted resilience. The flexibility, on the other hand, helps the wheel over the obstacle.

At higher speeds (see Fig. 11, page 198) the tire is off before rebound begins and expands against the atmosphere.

The evidence from automatic records is overwhelmingly against the theory that the resilient reactions help in propulsion, but shows conclusively that they cause the axle to bounce remarkably and uselessly at the low vehicle speeds.

In the case of airless tires it is no longer so hopeless to try to imagine a structure permitting ample flexion and avoiding immediate rebound, and thus producing somewhat the same effect that an air tire produces at high speed. This would of course be very acceptable even if the power spent in flexions for shocks were much greater than that similarly spent in a racing tire, as it could be offset by small flexions on smooth ground—where tire economy is mostly determined.

But it must be admitted that so far no material or arrangement of materials has been devised which will allow large flexions under shock while nevertheless sustaining a load with small flexion. The idea of such a material and of the manner in which it would have to be used—large wheels and large contact area—represents only an aim more rational than the aim for higher resiliency.

Resilience Rejected as a Measure of Tire Efficiency by S. A. E. Standards Committee

IN connection with the preceding article, special interest will be taken in a portion of the report rendered at the meeting of the S. A. E. Standards Committee in April by the Electric Vehicle Division and the action taken by the Committee in rejecting its repeated recommendation to accept an instrument for measuring the resilience of tires as standard for testing the efficiency of solid tires.

The opinions expressed at the meeting are rendered in substance in the following extract from the official report appearing in the S. A. E. Bulletin for May.

A. J. Slade, chairman of the Electric Vehicle Division, in re-submitting the former recommendation regarding efficiency tests of solid tires, said: "The rebound instrument developed by E. R. Whitney has been in use by him for several years. He buys all the tires for the Commercial Truck Company of America on the basis of tests with that instrument. F. A. Whitten has been buying all the tires for the General Motors Truck Company on the basis of tests with the instrument. Several other members of the Division who are manufacturers have been using it. I, personally, immediately after the rejection of the report last winter, incorporated the test in the specifications which I drew for motor tractors for New York's street cleaning department.

"It is of course a matter of indifference to the electric vehicle makers, all of whom are represented on our Division, whether the recommendation is rejected, because most of them are using the instrument and more of them are going to use it. It is only a question whether the Society wants to recommend it. It is in use. It has become a standard."

C. B. Whittelsey had no doubt that the instrument was all right in the hands of its designer but was skeptical about placing it in the hands of the people who generally purchase tires. He was quite sure that three or four of the largest tire manufacturers in the country are not using it in their factories. His own company had found too much friction in the instrument, due to rust. In conclusion he said: "We might produce a tire of a compound that would give a very high rebound test but very poor mileage. As Mr. Hall had said at the Society meeting, the shape of the tire makes a difference. It seems to me that a more practical test could be developed."

W. H. Allen: "We question whether the rebound test, which seems to indicate resiliency only, is necessarily indicative of what a tire will do, in so far as efficiency is concerned. In other words, we seem unable to establish a definite link between efficiency and resiliency. In making tests to determine this, we have found that certain non-resilient tires over certain surfaces gave the highest efficiency tests. On a smooth and hard surface a steel tire is most efficient, so long as there is no slippage. On a very rough road some very soft tire seems to be more efficient. It seems that there is no definite relation between the efficiency shown by the rebound test and by road test. I think that it would be best to have such points settled, tested out to a conclusion, before we decide that rebound testing indicates what a tire will do in service."

C. B. Whittelsey: We have been trying for over two years to develop the rebound instrument so that it could be used practically. We are now developing at great expense a current consumption testing machine. I think it gives much better information.

W. H. Allen asked not to be misquoted as denying all relation between resiliency and efficiency, but they had not been able to establish it for solid tires. It was very well known that there is a relation in certain other tires, for example in pneumatic tires, which are highly resilient and highly efficient under some forms of construction.

The section of the report under discussion was laid on the table pending further investigation by the tire companies and the vehicle manufacturers.

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The Bottom

THE 1916 car buyer has two major factors perplexing him: First, he is amazed at some of the price reductions with no apparent reduction but rather increase in the total quantity of car offered. Second, he is still further amazed at the possibilities of cylinder multiplication and wonders where the end of such will be and where is the bottom of prices. Hand in hand with this comes fabulous stock dividends, automobile war stocks steadily rising and he wonders if it is all profit in building cars, particularly if you build the car the people want and can sell it at figures which the public did not think was possible.

King Solomon when he wrote "of making many books there is no end" might have added "of making automobiles there is no end." The enormous demands of today in the face of a world war, the increasing outputs of factories building cars for the masses but reminds us of the vastness of 100,000,000 population and the unmeasured fecundity of the soil of the great Mississippi valley agricultural territory. Perhaps some of our makers had better study more closely this great productive area, and then turn an attentive ear to the enormous possibilities in South America, to the field in Africa, to Russia, to Siberia, to the Canadian west, to Australia, and then take a firmer grip on life and business, going forward with the assurance of success.

Board Speedways

THE building of board speedways in America is nearly on a par with war order business is motor trucks. Every week brings some new one into the limelight, and if the present pace is maintained it will be but a short time until we have not enough cars and drivers to fill the schedules and dates. Today the board speedway is an uncertainty, it is looked upon to give higher speeds than brick or cement, but there is the possibility of skidding more easily, particularly when wet or greasy. The use of pans under the cars should prevent this. One pronounced advantage of wood will be the freedom from vibration as compared with brick.

The new board speedways will differ from the existing Indianapolis speedway in one other essential, namely, that they are banked for much higher speeds and it may be possible to drive the curves at speeds of over 100 miles per hour without having to shut off the motor. If this prove so, and it is to be hoped it will, a new aspect will be brought forward in racing, that is, a possibility of continued high-speed work with not a second of let-up. The momentary shut off at the turns on Indianapolis have been rest periods for the engines, and drivers will be facing an entirely new order of motor test if these momentary tests are eliminated. Designers will then have to work to meet a higher order of test and the test supreme will be administered.

South American Etiquette

WHEN in Rome do as the Romans do and when transacting business with the Latin nations of South America begin your business along the lines that these people have been accustomed to do business in. Do not start as a revolutionizing radical but rather as an astute student of merchandising, finding out first what South America wants and then endeavoring to give it in the way she wants it.

Business deals are not infrequently opened by personal letters and these should be the subject of extraordinary care, not the flippant type you write to a dealer who has handled your line for 6 years but rather the carefully edited letter of the diplomat. The letter must be written in Spanish if that is the language of the city for which it is destined. It must be in South American Spanish and not New York Spanish. Such letters must be signed in ink by the sender, not signed by some clerk or with a rubber stamp. These are minor formalities that must receive primary consideration. Then, too, it will pay to get out special letter heads for South America, preferably in Spanish for Spanish-speaking cities. Naturally, if these conform to the South American standards of severe business plainness they will be best received. If after several years of close business associations and after you have met your South American merchant face to face in New York or in Buenos Ayres, you desire to change your stationery you may do so, but at the start follow the course of least resistance and lend an attentive ear to the tutor of Latin-American methods.

Packard 12's $2,600 and $2,950

1916 Prices Are $1,150 to $1,800 Lower Than for 1915 Models

DETROIT, MICH., June 7—The prices of the 1916 Packard cars have been announced and show a reduction of from $1,150 to $1,800 as compared with the prices of the 1915 models.

All open bodies of model I-25, or the small twelve, are listed at $2,600, which is the lowest price at which a Packard was ever listed and is $1,150 lower than the price of the 1915 3-38 runabout. Model I-35, which is the big twelve, is listed at $2,950 for all open bodies. This is $1,800 less than the price of the 1915 model 5-48 runabout, or big six.

The original schedule was for an output of between 7,000 and 8,000 twelves for next season, but, at the present time the dealers and distributors have already contracted for practically the entire production and there seems to be no doubt that action will be taken for a much larger production than originally planned.

Herewith are the prices of all the body styles of the 1916 Packard:

Model I-25	
All open bodies	$2,600
Coupé, 3 passengers	3,550
Limousine, 6 passengers	4,000
Landaulet, 6 passengers	4,000
Brougham	4,050

Model I-35	
All open bodies	$2,950
Limousine, 6 passengers	4,350
Brougham, 4 passengers	4,400
Limousine, 7 passengers	4,400
Limousine with cab side	4,450
Landaulet with cab side	4,450
Imperial limousine	4,600

Daniels Co. to Build Eights in Reading

READING, PA., June 4—Application will be made to the governor on June 25 by G. E. Daniels, N. E. Parish and J. A. Archer, of this city, for a charter for the Daniels Motor Car Co., Reading. The corporation is to be capitalized at $100,000.

As was stated in THE AUTOMOBILE for May 20, the company will manufacture a medium-priced eight-cylinder car. It expects to manufacture 500 the first year.

Auburn Continues Six and Four

NEW YORK CITY, June 8—The two models which will constitute the 1916 Auburn line will be much the same as the 1915 cars in general construction, but many detail improvements have been made; the price of the six remains at $1,550, while that of the four has been reduced from $1,075 to $985.

The motor of the smaller car, the 4-38, has been increased from 3 3-4 by 5 to 3 7-8 by 5; Remy starting, lighting and ignition equipment is fitted; wheelbase is 114 inches; rear axle Weston-Mott three-quarter floating, and tires have been increased from 33 by 4 to 34 by 4.

The larger model, 6-40, has Continental motor 3 1-2 by 5, 126-inch wheelbase, full seven-passenger body with auxiliary seats that fold entirely out of the way and when in use are supported from the front, electric starting and lighting and complete equipment.

Both cars have cantilever springs and the bodies in both models are alike in their lines, having round-edged, tumble-home sides and a straight line from radiator cap to back of tonneau.

Eight-Cylinder Mitchell at $1,450 for 1916

RACINE, WIS., June 5—The Mitchell-Lewis Motor Co. is bringing out an eight-cylinder car to sell at $1,450 in roadster and five-passenger touring form; deliveries will be commenced later in the summer. The car is equipped with a 3 by 5⅛ V-type motor, the connecting-rods being side by side and the cooling on the thermo-syphon plan. The feature of the motor will be the combination of water and intake manifold, the carbureter being mounted between the cylinder block and feeding horizontally into the manifold, with the cooling water circulating in a jacket around the intake manifold. As is customary, the cylinder blocks have L-heads with the valves inside the V. The regular Mitchell clutch and transmission mechanism is employed. The wheelbase is to be 116 inches and tires will be 34 by 4, the rear springs being three-quarter elliptic. Regular equipment includes Westinghouse lighting and starting, vacuum gasoline feed, non-glaring headlamps and one-man type of top.

Moore Car a Newcomer

MINNEAPOLIS, MINN., June 4—The Moore Motor Co., Minneapolis, has begun preparations for the production of a new car called the Moore 30 which will sell for $660, in five-passenger touring form. The Moore employs a Pontiac chassis, made by a new concern in Pontiac, Mich., which builds chassis only. The Pontiac was described in a recent issue of THE AUTOMOBILE. Bodies for Moore cars will be purchased of the Wayne Works, Richmond, Ind., and equipment from well-known makers. The concern's schedule calls for 500 cars to be produced by January 1, starting actual work this month.

The Moore has a 106-inch wheelbase, 30 by 3½ tires, and is fitted with a four-cylinder, 3¼ by 4½ block motor. The price given includes Disco cranking and lighting system, demountable rims and the other regular equipment.

Enjoined from Using Hanlon Shield

N. A. C. C. Members Lose Windshield Suit — Court Issues Injunction

CLEVELAND, O., June 5—By a decision handed down this week the Rauch & Long Carriage Co., of this city, and all members of the National Automobile Chamber of Commerce, Inc., with the sole exception of the Anderson Electric Car Co., which is licensed under the patent, are enjoined from using the Hanlon patented windshield in automobiles. This injunction comes as a sequel of a decision handed down last March, which declared the Hanlon patent valid. At its annual meeting, held this week in New York, the National Automobile Chamber of Commerce, Inc., voted to appeal against the injunction. The case in question is particularly important in that many manufacturers are using the Hanlon idea of windshield, which is a double glass with the outer or forward glass divided and the top half adjustable so that it can be inclined forward to serve as a rain vizor if necessary. It is reported that should the vizor be made stationary it does not infringe the Hanlon patents.

R. & L. Agent of N. A. C. C.

The injunction has been issued by the U. S. District Court for the Northern District of Ohio, Eastern Division, and is in the case of William B. Hanlon et al against the Rauch & Lang Carriage Co., involving the re-issued patent No. 13,653 and follows the decision handed down in March by Judge Clark in the District Court. The National Automobile Chamber of Commerce acted as a co-defendant in this suit with the R. & L. company, the latter company acting as its agent.

Eagle—New Electric Car

DETROIT, MICH., June 4—The Eagle Electric Automobile Co. has been incorporated, the capital stock being $100,000. The company was formed several months ago to build an electric motor car according to the design of Herman A. Schmidt. Temporary quarters were taken at 169 Howard street, where the first models were completed. The incorporators of the concern are: Herman A. Schmidt, Cass C. Smith, Henry Clay Judson.

Grant Clover-Leaf Roadster

FINDLAY, O., June 5—The Grant Motor Co., of this city, has in a state of completion a clover-leaf roadster. It will be completed within the next few weeks.

Cleveland Electrics Merge

Baker and Rauch & Lang Unite as Baker R. & L. Co.—Capital Increased

CLEVELAND, O., June 7—The Rauch & Lang Carriage Co., and the Baker Motor Vehicle Co., both well-known manufacturers of electric passenger cars have merged into one, this action becoming effective today and henceforth the two concerns will operate as one under the firm name of Baker R. & L. Co. The agencies of the two companies will be combined in all cities.

In order to bring about the merger Rauch & Lang increases its capital stock of $1,000,000 to $2,500,000, of which addition $750,000 is 7 per cent. preferred and the balance common. The capital stock of the Baker Co. is $600,000. This gives a total capital stock of $3,100,000. In order to complete the merger inventories and appraisals are being made but for all practical purposes the business of the two firms is being conducted as one from this date forward. It is not known whether the name of the cars will be changed in any way to conform with the new organization.

In the list of officers many of the old officers of both Baker and Rauch & Lang companies have been continued and are as follows: President, C. L. F. Wieber, president of the Rauch & Lang Co.; first vice-president, F. R. White, vice-president and general manager Baker Co.; second vice-president Chas. E. J. Lang, vice-president and treasurer Rauch & Lang Co.; treasurer R. C. Norton, treasurer Baker Co.; secretary, G. H. Kelly, secretary Baker Co.; counsel, F. W. Treadway, secretary Rauch & Lang Co.

This is the second merger that has taken place in the electric car field, the other occurring in January, 1914, when the American Electric Car Co. was formed by the merging of the Argo Electric Vehicle Co., Saginaw, Mich., the Borland Grannis Co., Chicago, Ill., and the Broc Electric Co., Cleveland, O.

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Bossert Co. Increases Capacity

UTICA, N. Y., June 7—The Bossert Co., this city, manufacturer of special automobile parts and accessories, is erecting a new building increasing the size of its oxy-acetylene plant which is stated to be one of the largest in the United States. They are also putting up a new 25 by 100-foot building to increase by 50 per cent. the size of the finishing department which does whatever machine work is necessary on automobile parts as they come from the presses. Still another building is being started which when completed will double the polishing, nickel plating and enameling departments. Along with the increase in floor-space there has also been a notable increase in machinery one of the recent orders being for a $20,000 press for the production of pressed steel parts for the automobile trade. This will particularly include axle housings, brake drums, etc.

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To Be United States Light and Heat Co., Inc., of N. Y.

NEW YORK CITY, June 4—The United States Light & Heat Co., Inc., of New York, is to be the new name of the United States Light & Heating Co. of Maine. The capitalization is to be $3,000,000, 7 per cent. non-cumulative preferred, $4,000,000 common stock, and $1,000,000 authorized first mortgage 6 per cent. 20-year sinking fund gold bonds, of which $50,000 are to be issued at once, the remainder being reserved for capital purposes. The bonds are dated June 1, 1915, due June 1, 1935, are in coupon form and in denominations of $100, $500 and $1,000.

The stockholders' protective committee of the U. S. L. company has issued a circular to the stockholders announcing that more than 90 per cent. of the preferred and 70 per cent. of the common stock deposited by the committee have already paid the subscriptions provided in the plan. The time for the payment has now been extended to June 19, both for the stocks and bonds of the company.

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1916 New Era Sells for $650

JOLIET, ILL., June 4—The New Era Engineering Co., this city, has announced its 1916 touring model selling at $650. A bloc motor, 3 1-8 by 4 1-2, inclosed valves, developing 27 horsepower at 2,000 r.p.m. is used. Other features are cellular radiator thermo-syphon cooling, Allis-Chalmers single unit starting and lighting system, multiple disk clutch; four-speed selective transmission, three-quarter floating rear axle, semi-elliptic springs in front and full elliptic in rear, and Atwater-Kent ignition. The wheelbase is 104 inches and the tread 56.

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Dayton New Era Chief Engineer

JOLIET, ILL., June 4—W. O. Dayton has resigned as engineer of the Crusader Motor Car Co. and is now chief engineer and one of the principal stockholders of the New Era Engineering Co., manufacturer of the New Era automobile.

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Chevrolet Makes Record Shipment

NEW YORK CITY, June 9—On June 3 the Chevrolet Motor Co. shipped and delivered to its dealers 541 cars valued at $334,173. This is the largest shipment for any single day in the history of the company and exceeds by nearly 100 per cent. the previous high record.

April Exports $8,045,222

Over $5,000,000 Ahead of 1914 Mark and Lead All Previous Records

WASHINGTON, D. C., June 8—*Special Telegram*—A world's record was established in April when automobile and commercial vehicles, valued at $8,045,222, were exported. This is $5,212,068 ahead of April, 1914. Two thousand, two hundred and sixty-seven commercial vehicles, valued at $5,240,481 and 3,078 passenger vehicles, valued at $2,804,741, were shipped.

During the 10 months ended April, the exports were 8,580 commercial vehicles valued at $23,977,968 and 14,641 passenger cars, valued at $12,356,472. For the same period in 1914, the exports were 23,762 cars and trucks, valued at $21,598,810.

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Harry Lozier to Re-Enter Car Building Field

DETROIT, MICH., June 7—Harry A. Lozier, who was the founder and head of the former Lozier Motor Co., from which he retired in 1912, has been quietly at work on a new automobile organization for the past year and a half, and is now about ready to make known the details of the new enterprise. All facts about the car that is to be built, and about the men who are to be associated with him are withheld for the present but the plant is to be located in Cleveland, O. It will be built for the new concern on an advantageous site. Plans now contemplate a production for the first year of 3,500 cars.

Interviewed by a representative of THE AUTOMOBILE, Mr. Lozier made clear his reasons for wishing to withhold details at this time, but enough information was given to permit it to be said that he will again enter the manufacturing field with a most efficient organization, and with ample capital. None of it is to be put upon the market.

The design and full details of the car have been definitely settled upon.

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Lippard-Stewart Reduces Prices

BUFFALO, N. Y., June 7—Without altering the construction of two of the types of commercial vehicles which it is producing, the Lippard-Stewart Motor Car Co. has made substantial reductions in its prices. Effective May 25, the 1,500 pound chassis with bevel gear drive and pneumatic tires lists at $1,500; the same chassis with worm drive and either pneumatic or solid tires lists at $1,600. The reduction represents a cut of from $150 to $175.

Ford's $48,000,000 Dividend

Eight Stockholders Divide It—Henry Ford Gets $27,840,000—Capital Raised

DETROIT, MICH., June 5—At a meeting of the Ford Motor Co., today the capital stock was increased from $2,000,000 to $100,000,000 and the directors declared a stock dividend of $48,000,000, which will go to eight directors. In addition there was a large cash dividend declared on the original capitalization of $2,000,000, details of which are not available. Henry Ford alone profits to the extent of $27,840,000 by this stock dividend, and James Couzens, vice-president of the company, receives $5,472,000. This stock dividend, which represents 2,400 per cent., will be paid in July.

The stock increase brings the issued capital stock of the company to a valuation of $50,000,000, and the remaining $50,000,000 will remain in the treasury to be used as conditions may demand in future. The object of the capital increase, as given by Treasurer Couzens, is to have the outstanding shares more nearly represent the value of the property of the company.

In the distribution of the stock dividend eight, or rather the eight only holders of stock in the Ford Motor Co., of Detroit, will share. They are:

Henry Ford, president, who is credited with owning 11,700 shares out of the total of 20,000, or 58.5 per cent., and will thus receive $27,840,000.

James Couzens, vice-president, credited with holding 2,280 shares, or 11.4 per cent., and will receive $5,472,000.

David Gray, vice-president of the Detroit Leather Specialty Co., who is said to own 2,000 shares, or 10 per cent., and will receive $4,800,000.

John F. Dodge, president and treasurer of Dodge Bros.; Horace E. Dodge, vice-president and general manager of Dodge Bros.; Horace H. Rackham and John W. Anderson, both attorneys, all said to own 1,000 shares, or 5 per cent., and who will thus receive $2,400,000, and R. V. Couzens, son of Vice-President Couzens, reputed to own 20 shares, or one hundredth of 1 per cent., who therefore is to receive $48,000.

Concerning the rebate which is to be paid to Ford purchasers during the fiscal year ended July 31, and which is to be made good only in case 300,000 Fords had been sold, it is stated by an official that probably fully 350,000 cars will be the total entitled to the rebate, and that the amount will be between $16,500,000 and $17,500,000.

The last balance sheet of the Ford Motor Co. is dated September 30, 1914. At that time the company had a surplus of $48,827,032.07. Its total assets then were $61,632,257.16, of which $27,441,468.79 was cash in the banks.

Through its increase of capital the Ford Motor Co. is now on top of the list of all automobile manufacturing concerns in the world as to its capital. With the exception of the United States Rubber Co. which has an authorized capitalization of $120,000,000, no other concern in the automobile car or parts business has as large a capital as the Ford company. The accompanying table was made with a view of showing especially the capital standing of some of the larger concerns:

CAPITALIZATION OF SOME AMERICAN AUTOMOBILE MANUFACTURING CONCERNS

Ford Motor Co., Detroit	$100,000,000
†General Motors Co., Detroit	60,000,000
Studebaker Corp., Detroit	45,000,000
Maxwell Motor Co., Detroit	37,000,000
Willys-Overland Co., Toledo, O.	30,000,000
Packard Motor Car Co., Detroit	16,000,000
Peerless Motor Car Co., Cleveland, O.	10,000,000
Mitchell-Lewis Motor Car Co., Racine, Wis.	10,000,000
Chalmers Motor Co., Detroit	6,500,000
Dodge Brothers, Detroit	5,000,000
*Olds Motor Works, Lansing, Mich.	4,000,000
Reo Motor Car Co., Lansing, Mich.	3,000,000
White Co., Cleveland, O.	3,000,000
Regal Motor Car Co., Detroit	3,000,000
*Buick Motor Co., Flint, Mich.	2,600,000
Chevrolet Motor Co., Flint, Mich.	2,500,000
Anderson Electric Car Co., Detroit	2,500,000
Hudson Motor Car Co., Detroit	2,500,000
*Cadillac Motor Car Co., Detroit	1,500,000
Hupp Motor Car Co., Detroit	1,000,000
Winton Co., Cleveland, O.	1,000,000
Rauch & Lang Carriage Co., Cleveland, O.	1,000,000

CAPTALIZATION OF SOME AMERICAN AUTOMOBILE PARTS MANUFACTURERS

Stewart - Warner Speedometer Corp., Chicago	$11,000,000
Timken-Detroit Axle Co., Detroit	3,000,000
Continental Motor Mfg. Co., Detroit	2,500,000
*Weston-Mott Co., Flint, Mich.	1,500,000
‡Fisher Body Co., Detroit	1,500,000
‡Fisher Closed Body Co., Detroit	600,000
Detroit Lubricator Co., Detroit	1,000,000
Hayes Mfg. Co., Detroit	750,000
Kelsey Wheel Co., Detroit	1,000,000
C. R. Wilson Body Co., Detroit	750,000
McCord Mfg. Co., Detroit	1,000,000
Northway Motor & Mfg. Co., Detroit	1,000,000

CAPITALIZATION OF SOME LEADING TIRE MAKERS

U. S. Rubber Co.	$120,000,000
H. F. Goodrich Co., Akron, O.	90,000,000
Morgan & Wright, Detroit	5,000,000
Firestone Tire & Rubber Co., Akron, O.	4,000,000
Goodyear Tire & Rubber Co., Akron, O.	15,000,000
Kelly-Springfield Tire Co.	7,757,200

†Among the companies which are part of the General Motors Co., are the Olds Motor Works, Buick Motor Co., Cadillac Motor Car Co., Weston-Mott Co.

*These are subsidiary companies of the General Motors Co.

‡These two concerns might be considered as one, being owned and directed by the same men.

Ford Has Built 819,922 Cars

DETROIT, MICH., June 4—Up to June 1, 1915, the Ford Motor Co. has built and sold a total of 819,922 Ford cars. The company started in business June 16, 1903, and has been building Fords for 12 years. Practically 55 per cent., or over 400,000 cars, were made during the past 2 years.

English Firm Gets Lauth-Juergens

Succeeded by H. G. Burford Co.—War Orders Factor in Reorganization—New Blood

FREMONT, O., June 5—The H. G. Burford Co. has been organized in this city to take over the Lauth-Juergens Motor Truck Co. for the purpose of manufacturing the Burford motor truck, orders for 2,000 having been secured from Great Britain. The officers of the new company are: President, H. G. Burford, London, Eng.; vice-president, J. W. Worst; secretary, John M. Sherman, and treasurer, R. J. Cristy. The new company is incorporated for $250,000, of which $100,000 is in preferred and $150,000 in common stock.

Mr. Burford, the president of the new corporation, who has been in this country for several months studying conditions in the truck industry, is also president and managing director of the H. G. Burford Co., Ltd., London, Eng., one of the pioneer motor vehicle concerns of Europe. The London company has numerous branches in Great Britain and her colonies and in other European countries. Mr. Burford formerly operated and controlled the business of Milnes Daimler, Ltd., who represented the manufacturer of the Mercedes, and the truck business in England was of considerable volume and international in character. In the past three months Mr. Burford has taken about 150 trucks from the Lauth-Juergens factory.

H. S. Chipman, of Chipman, Ltd., who is also a member of the board of directors of the new company, is an exporter of New York City.

Mercer to Add 24,000 Square Feet

TRENTON, N. J., June 9—The Mercer Automobile Co. will again enlarge its plant. Contracts have been let for the construction of a new building which will contain 24,000 square feet of floor space.

The plans call for a structure 60 by 400 feet, and the steel and glass form of construction will be employed. When completed, the building will house the various paint departments, as well as the final assembly.

Torbensen Gear Buys Cleveland Plant

NEWARK, N. J., June 9—Increased business of the Torbensen Gear & Axle Co., this city, has forced the company to look elsewhere for factory space, the local plant having become inadequate. The company has secured a factory at Cleveland, O., with five times its present capacity, where it will be located after June 15.

Booster Meeting for Detroit S. A. E.

Addressed by Four Past-Presidents—Hint at Great Extension of Activities

DETROIT, MICH., June 8—*Special Telegram*—A well attended meeting of the Detroit Section of the Society of Automobile Engineers was held here tonight for the purpose of encouraging general enthusiasm in the Society's work. The meeting was addressed by four past-presidents, namely: Howard Coffin, vice-president of the Hudson Motor Car Co.; H. W. Alden, chief engineer of the Timken-Detroit Axle Co.; Henry M. Leland, president of the Cadillac Motor Car Co., and Henry Souther, vice-president of the Ferro Machine & Foundry Co. The other speakers of the evening were Coker Clarkson, general manager of the Society, and K. W. Zimmerschied, metallurgist of the General Motors Co. and chairman of the standards committee. George W. Dunham, consulting engineer, presided.

Among other remarks Mr. Coffin hinted that great extensions of the Society's activities may be expected, including the resuscitation of the old A. L. A. M. engineering digest of the technical news of the world, the establishment of a large permanent library, etc. It was also stated that the Detroit Section should have proper permanent headquarters in this city. Members were urged to encourage executive men to join the Society as they had to carry out the ideas formulated perhaps by engineers. The meeting was voted one of the most successful and instructive ever held in Detroit.

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Chicago Speedway Finished

CHICAGO, ILL., June 9—The wooden bowl of the new $1,250,000 Chicago speedway was finished this week. In 36 actual working days, the 9,000,000 feet of lumber of which the track is constructed were laid and spiked down. The last nail was driven home Monday and the course was open for practice the following day. Two of the drivers, Billy Carlson and Billy Chandler, who worked out their cars on the track before it was completed, pronounced it especially fast.

Although the entry list does not close until tomorrow at midnight, the field of starters to date for the inaugural event includes the following twenty-six cars: Stutz, Anderson; Stutz, Cooper; Stutz, Wilcox; Mercedes, Ralph DePalma; Sunbeam, Von Raalte; Sunbeam, Porporato; Duesenberg, Alley; Duesenberg, O'Donnell; Duesenberg, Haupt; Maxwell, Carlson; Maxwell, Rickenbacher; Maxwell, Orr; Delage, Chevrolet; Bugatti, Oldfield; Peugeot, Burman; Peugeot, Resta; Peugeot, Babcock; Sunbeam, Grant; Sunbeam, Limberg; Mulford Special, Mulford; Mercer, Henning; Berwyn Special, Zucker; Du Chesneau, Brown; F. R. P., Keene; F. R. P., Hughes; and F. R. P., Devore.

Barney Oldfield has entered the Bugatti but will not drive it. Barney has purchased one of the Grand Prix Peugeots and if it arrives in time, will substitute it for the Bugatti.

Louis Chevrolet has secured the Delage that John DePalma drove at Indianapolis, and has been working on it at the Marmon plant in order to get it in shape for the Chicago race.

Elimination trials have been postponed until next Monday, Tuesday and Wednesday in order to give the drivers more time to get their cars in shape for the time tests. Only five machines have arrived to date—the three Maxwells and the two Peugeots to be driven by Resta and Babcock.

The promoters are confident that 100,000 persons will witness the inaugural race. The grandstands, along the home stretch and in front of the pits, will seat 25,000. The bleachers on the back stretch will accommodate 27,000. There is parking place for 5,000 cars within the inclosure. In addition, temporary bleachers, seating 25,000, will be erected back of the parking places. The track has been pronounced safe by A. A. A. and municipal officials.

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Kelly-Springfield Tire on 24-Hour Schedule

AKRON, O., June 9—The plants of the Kelly-Springfield Tire Co. are operating a 24-hour-a-day schedule. Business already contracted for calls for a continuance of this rate of operation during the next 6 months at least.

Last week sales showed an increase of 72 per cent. over the same period a year ago, and in the previous week the gain was 100 per cent. Business so far this year is running at the rate of $8,000,000. The 1914 sales were approximately $5,000,000.

The company is now putting out 1,000 tires a day, or at the rate of over 300,000 tires a year.

Large earnings, said to be close to 30 per cent. on its common shares, compared with 22 per cent. in the year ended December 31, last, will probably bring forth an extra disbursement on that stock as a cash dividend this fall.

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Kelly-Springfield Tire Dividend

NEW YORK CITY, June 9—Kelly-Springfield Tire Co., regular quarterly dividend of 1 1-2 per cent. on first preferred and 1 3-4 per cent. on second preferred, payable July 1 to stock of record June 15.

Wagon Men Favor One Tread

N. A. C. C. Meets with Vehicle Makers to Standardize 56-Inch Tread

WASHINGTON, D. C., June 8—Considerable progress was made today in the question of arriving at some standard tread for vehicles in the southern states, where automobile manufacturers have been compelled to furnish 60-inch treads because of the wider wagon treads used. The National Automobile Chamber of Commerce has been for over a year endeavoring to see if the 60-inch tread cannot be discontinued and, with this object in view, Alfred Reeves, general manager of the N. A. C. C., had a conference today with representatives of the various wagon and vehicle associations in conference in this city. Today the wagon makers passed resolutions favoring a standard tread for the near future and looking to the automobile makers to lead the way in this movement during the next 12 months. For the present the wagon makers will continue 54 and 60-inch treads, but are agreed that improved road conditions demand the adoption of a standard tread for all vehicles.

Objections to 60-Inch Tread

The various wagon and vehicle associations were represented as follows: National Wagon Manufacturers' Assn., J. D. Hollowell, chairman of the Tread Committee; National Implement and Vehicle Assn., E. W. McCullough; Southern Wagon Manufacturers' Assn., B. P. Thornhill. Others in the conference were: Logan Waller Page, of the United States Bureau of Good Roads; D. E. Parsonage and Alfred Reeves. Mr. Reeves emphasized the fact that fifteen out of ninety-five manufacturers who are members of the N. A. C. C. manufactured wide-tread cars, that is 60-inch treads, and that the majority of automobile dealers in the South are strongly in favor of discontinuing these treads because they hold up deliveries. Manufacturers object to them in that they seriously handicap production and make it impossible to switch shipments from a point in the North where standard treads are used to one in the South where the wide tread is desired. Wagon manufacturers are agreed in this argument. Mr. Page, representing the government good roads favors a standard tread and considers it highly desirable now that the movement for improved roads in the South is under way.

The Southern Wagon Manufacturers' Assn. meets in Norfolk, Va., tomorrow, and some action may be taken.

Federal Commission Hearings Bring Out Weaknesses in Export Trade

Develop Need of Combines for Foreign Commerce—Shipping Facilities Needed—Government Bonded Warehouses Proposed—Common Selling Agencies Advocated

NEW YORK CITY, June 5—The recent visit of the Federal Trade Commission to this city on June 3 and 4 brought out an assortment of complaints and facts gleaned from some thirty prominent business men who offered testimony as to trade conditions, bearing mostly on the proposition of getting and holding considerably more export trade. The purpose of the hearings, as stated by Chairman J. E. Davies, was to exercise the powers conferred by subdivision H of section 6 of the Federal Trade Commission act passed by the late Congress. This portion of the act provides that the Commission composed of W. H. Parry, E. N. Hurley, W. J. Harris and George Rubles, shall have power to investigate, from time to time, trade conditions in and with foreign countries where associations, combinations or practises of manufacturers, merchants, or traders, or other conditions, may affect the foreign trade of the United States, and to report to Congress thereon, with such recommendations as it deems advisable.

Out of the great diversity of opinion and questioning a few threads stood out to show the following needs to increase the export trade:

The Sherman Law a Factor

The desire to clarify the situation as affecting prospective trade combinations to carry on export business as related to the Sherman anti-trust act; the question of providing adequate shipping facilities; the matter of credits; the advancement of fair trading methods between the United States and the other countries; a more direct form of government aid; more combinations of our business units to compete with foreign competitors; an anti-dumping law; low-priced government bonded warehouses for Latin-America, and the establishment of common selling agencies.

Doubt Is Prohibition

Proceeding on the assumption that it is practically impossible to cope on even terms with foreign interests in the absence of combines of United States traders in the export field, the doubtful interpretation of the Sherman law as bearing on such combines loomed up as the most substantial barrier. This doubt, it was agreed, is holding back business men, big and small, and there will be no considerable improvement until the doubt is cleared away. This thought was forcibly expressed by Henry P. Davison, of J. P. Morgan & Co. on the first day of the hearing. Following his advocacy of an improvement in shipping conditions, Mr. Davison said:

"The question must be solved if we are going to look for a material increase in foreign trade. Some form of combination of our business units must be devised if we are going to do much in the foreign markets. Combination would make it possible to cut down costs and effect concentration. Nobody knows what the Sherman anti-trust law prohibits, so the effect would be just the same if it did prohibit."

No Domestic Monopoly

In answer to questions Mr. Davison gave it as his strong opinion that a combination for foreign trade could be easily kept free of a monopolistic tendency as affecting the domestic trade and that there is no fear of increasing costs to the consumer of this country through the proposed action in export branches. This statement seemed to impress the Commission and was received with general interest as bearing on a point raised some time ago by President Wilson in his suggestion that it might be advisable to permit combinations of United States business concerns to compete with similar combines formed by foreign competitors. In making his statement, it is recalled, the President stated that he would be in favor of such action if it could be put through without detriment to the American consumer, but made it equally clear that he would be against it if such detriment should be likely to follow.

The Matter of Dumping

Many of the witnesses went into the need of an anti-dumping law, there being an apparent apprehension that the close of the European war will see the practice carried out on a larger scale than ever before, the expectation being that the Europeans will open their factories and operate them to capacity, absorbing the losses on surplus production sold below cost. The situation was discussed comprehensively by W. H. Taylor, president of the David Williams Co., publisher of *Iron Age, Hardware Age, Metal Worker, Plumber and Steam Fitter and Building Age.* Mr. Taylor cited the case of T rails as exemplifying the evils of the practice, calling attention to Canada's high tariff on this class of merchandise, which makes it difficult for the American producer to find a market in that country, while having no means, such as an anti-dumping law, to prevent the Canadians from underbidding our manufacturers, even when selling at a loss. In the case of a purchase of 35,000 tons of steel rails needed by the Illinois Central Railroad some time ago, according to Mr. Taylor, the domestic producers bid on the basis of $28 a ton, the standard price, while the Canadians got the business by offering the rails at several dollars a ton less, even at a time when the product was selling in Canada at $32 or $33 a ton.

"Of course," said Mr. Taylor in substance, "I don't blame the railroad for placing the order on the most favorable terms but urge that such a condition would have been impossible if we had had an anti-dumping law similar to Germany's and those of other countries. The practice of selling rails at a standard price makes for stability. Under a condition of fluctuating prices a railroad may raise the funds necessary for a purchase of a needed quantity of rails and then when it goes into the market may find the price had risen and be unable to make the purchase with the funds on hand. The stable price obviates this possibility."

Mr. Taylor displayed some interesting exhibits in the shape of German-made locks and keys destined to be sold here at absurdly low prices, far beneath current prices here. In answer to a question Mr. Taylor admitted he could not see how there could be any profit to these goods. He ascribed the condition to the German practice of operating the factories to capacity and following the dumping process in the event of a surplus.

Fighting without Rules

A convincing presentation of the case for export combines was made by John D. Ryan, president of the Amalgamated Copper Co. and a member of the National Trade Council. After describing the methods of foreign combines in export markets and in import transactions as well, and touching on the lack of cooperative action among producers and traders of this country, Mr. Ryan drew a comparison between this situation and the case of a prizefighter who finds himself in the ring against a man who makes his own rules. "You can understand," he explained, "that the poor fellow has little chance if he sticks to Marquis of Queensbury rules, while the other fighter takes privileges not allowed under that code. He would be overcome rather easily. And in our foreign trade we have not only to contend with each other, but also with combines of other nations who don't observe our rules."

Under existing conditions, according to Mr. Ryan, copper produced here is bought up at sub-market prices by foreign cabals, the result being that the American manufacturer pays 7-8 of a cent per pound more than the German. This 7-8 of a cent represents the cost of manufacture, so the German maker owns his finished product at the price the American manufacturer pays for the raw material. In absorbing fashion and at length Mr. Ryan described the manipulations of foreign cliques and their schemes for setting the Americans to quoting against the alleged prices of their competitors. "Our principal competitor," said Mr. Ryan, "has offices less than two blocks from mine. Yet when a foreign buyer comes to me and tells of my competitor's quotations, even when I am certain he is not telling the truth, do you think I dare call up my competitor to challenge the foreigner's statement. No, I am afraid of the Sherman law, as it may be interpreted."

Whereas it was Mr. Ryan's view that all concerns, irrespective of size, be allowed to combine, since the "big fellows" would be anxious to take in the little ones through selfish interest, if for no other reason. Roger W. Babson, of the Babson Statistical Agency, took the view that it would be better to let the larger corporations shift for themselves, while permitting the smaller concerns—those of $1,000,000 capital or less to form into combines. Mr. Babson was not inclined to take an optimistic view of the prospects of American business in the foreign markets until such time as our young men—"flesh and blood" of this generation of producers—have been trained in the countries of their future activities and sufficiently imbued with the spirit of the various peoples to meet them on a basis of understanding and sympathy.

Mr. Babson's contention that the large corporation can carry on its foreign trade without combines was disputed by Waldo N. Marshall, president of the American Locomotive Co., who stated that his concern, capitalized at $50,000,000, found it not feasible to finance selling agencies in various parts of the world. "This condition," said he, "existing for us in some sections, must exist for some smaller concerns in the foreign field as a whole." Mr. Marshall touched on the matter of unfair competition when he declared that German competitors made use of many of his company's trade secrets, gleaned from documents passing through South American banks controlled by Europeans.

Warehouses for Latin-America

A suggestion that received close attention was the proposal of Woolsey H. Field, of the United Export Bureau, to establish government bonded warehouses in Central and South America. These warehouses could be employed to store goods included in advance orders until such time as demanded by the purchasers. According to Mr. Field's plan, a form of certification of deposit could be issued to the manufacturer, upon which funds could be advanced at a low rate of discount, varying according to the nature of the goods. This plan, in Mr. Field's judgment, would remove much of the inconvenience of the prevalent system of long term credits.

Mr. Field also urged some means of protecting United States trade marks against traders in South America who make a practice of appropriating them to their own uses, imitating and infringing with impunity. He also made a strong plea for an efficient supervision of American traders who in imposing upon the credulity of the Latins injure the reputation of our traders generally and make it difficult for any to secure business. The witness cited a case where a fake concern collected $5,000 for moving picture films as advertised and failed to fulfil its part of the contract by delivering the goods. It was Mr. Field's idea that our consuls be given wide authority and instructions to investigate advertisements of United States traders in Latin-American newspapers and magazines. Under present conditions a United States consul would not presume to take action, even in a case where the element of fraud is apparent.

Tricky Competition

The matter of tricky competition was also discussed by Walter Wyman, Export Manager of Carter's Ink Co. He told of a case where a Japanese concern imitated the Carter trade mark, substituting the title "Cart's" but following other details of the label closely. This sort of occurrence, according to Mr. Wyman, is not at all unusual in the foreign trade.

George H. Richards was also one of the few to appear in behalf of the specialty field, advocating common selling agencies. He took the stand that the "big fellows" would not care to enter into combination with little ones and "hold the umbrella while the little fellows get in out of the rain." George E. Smith, president of the Royal Typewriter Co., spoke in favor of combined selling effort in the foreign field.

William E. Saunders, chairman of the Board of Directors of Ingersoll-Rand Co., maker of machinery, came before the Commission with a well ordered digest of the ethics of foreign trading as he viewed it. Mr. Saunders may be said to have summed up the wishes of all the witnesses when he urged that legislation be enacted to the effect that combinations for foreign trade, which do not restrain or monopolize trade within the United States, shall be lawful.

Chili Shipments Are Rough

Country Has No Docks and Shipments Are Roughly Handled —Address in Spanish

NEW YORK CITY, June 8—Of the three most important countries in South America, Argentine, Brazil and Chili, the last is the only one that has no docks, and consequently shipping to its ports is correspondingly difficult and careful crating of automobiles consigned to Chili is essential. Steamers for Chili must lie off the coast discharging their cargoes onto lighters and if the sea is rough the crates containing automobiles get badly broken unless they are particularly rigid. Manufacturers will not find it necessary to take the automobiles apart in order to export to Chili, but it is desirable to make specially heavy crates.

In marking these crates the reading matter should be in Spanish and not English, this applying specially to such expressions as "top" and "bottom" which in Spanish are "Arriba" and "Abajo." Write these words very plainly in large letters on all sides of the crate.

American automobile firms when writing to South American merchants should be careful to personally sign all typewritten letters. Letters received in Latin America with signatures that are typewritten or stamped lose materially.

Any automobile makers desiring translations or further information on the South American market will receive prompt attention through the United Export Bureau of THE AUTOMOBILE.

Boston 1916 Car and Truck Show March 4-11

BOSTON, MASS., June 4—At the annual meeting of the Boston Automobile Dealers' Association it was decided to hold the 1916 motor show in Mechanics' Building the second week in March, and there will be an exhibit of commercial vehicles in the basement the same week. More than a score of dealers have filed applications for membership and it augurs well for the show next year. The treasurer's report shows that after paying dividends on the past show a good surplus remained. The election of officers resulted as follows: President, John H. MacAlman (Stearns); vice-president, Josiah S. Hathaway (White); treasurer, F. A. Hinchcliffe (Winton); secretary, Chester I. Campbell; board of directors, the above officers and Ernest A. Gilmore (Allen and Lewis), J. W. Maguire (Pierce-Arrow), John W. Bowman (Maxwell), Charles E. Fay (Ford), Charles P. Rockwell (Jeffery) and Frank E. Wing (Marmon).

Clifton Heads N. A. C. C. for 1916

Seven Companies Elected to Membership—Work for Standard Tread

NEW YORK CITY, June 6—Charles Clifton, treasurer of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., was re-elected president of the National Automobile Chamber of Commerce, Inc., at the annual meeting held here yesterday, which was characterized by a record attendance of members of the chamber. The other officers were all re-elected, as follows: First vice-president, W. C. Leland, vice-president and manager Cadillac Motor Car Co.; second vice-presidents (gasoline passenger car division), Hugh Chalmers, president Chalmers Motor Co.; (commercial vehicle division) Windsor T. White, president White Co.; (electric vehicle division) H. H. Rice, president Waverley Co.; secretary, R. D. Chapin, president Hudson Motor Car Co.; treasurer, George Pope, receiver Pope Mfg. Co.; general manager, Alfred Reeves.

Three New Directors

Beside re-electing three directors whose terms had expired, the chamber elected three new ones for a 3-year term. These are J. Walter Drake, president Hupp Motor Car Co.; R. E. Olds, president Reo Motor Car Co., and C. H. Pelton, secretary Maxwell Motor Co., these taking the places of Messrs. H. O. Smith, L. H. Kittredge and C. C. Hanch. Those re-elected were Alvan Macauley, manager Packard Motor Car Co.; W. E. Metzger, American Electric Car Co., and C. W. Churchill, general manager Winton Co.

Seven new companies were elected to membership at the directors' meeting on Wednesday, as follows:

L. P. C. Motor Co., Racine, Wis.
Scripps-Booth Co., Detroit, Mich.
Lexington-Howard Co., Connersville, Ind.
The Touraine Co., Philadelphia, Pa.
Pratt Motor Co., Elkhart, Ind.
W. A. Paterson Co., Flint, Mich.
The Sternberg Co., Milwaukee, Wis.

Reports of the year's work were made by the committees on patents, traffic, commercial vehicles, good roads and legislation, and after a spirited discussion of the jitney bus situation the conclusion was reached that the movement should be encouraged and supported by car manufacturers. Proper regulation was also advocated, it being agreed that there should be careful supervision of drivers, with payment of a license fee for the use of the streets and provision for indemnity against accidents. A special committee is continuing this work.

A special committee was appointed to make recommendations in regard to the proper time for making annual announcements of car models.

Statistics supplied at the meeting indicate that the automobile year ending June 30 will see a greater number of cars made than ever before in the industry, while the manufacturers are continuing their preparations for the following year in the most optimistic way.

It is not unlikely that one or two of the general membership meetings of the chamber may be held in Detroit, although the annual meeting will naturally be held each year at the general headquarters in this city, as required by the incorporation of the N. A. C. C. in this state.

It was voted to appeal from the decision of the Cleveland Court in the suit brought against Rauch & Lang Carriage Co., a member of the chamber, by William B. Hanlon and others, charging infringement of Hanlon patent re-issue No. 13,653, covering the well-known Hanlon windshield construction.

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Market Changes Few

NEW YORK CITY, June 8—Market prices last week were steadier with the usual changes. There was a big demand in the metal markets yesterday. The leading rise was in lead when it rose from $4.90 to $5.60, a total gain of 70 cents. The largest producing interests are still asking 19 1-4 cents delivered 30 days for electrolytic copper while Lake copper had the same demand with a gain of 1 cent for the week. Tin was active and higher, making a change of $1.37. Aluminum rose 2 cents, while the rest of the metals remained unchanged. Cottonseed oil was a little steadier with a fair volume of trading. Rubber markets were firm and lacked new features of importance. Fine Up-River Para was firm with a slight rise of 1 cent on Friday, while scrap rubber went down 1-2 cent. Manufacturers continued to restrict their purchases to comparatively small lots, but the demand for such quantities showed some increase. The markets in London were somewhat dull with plantation rubber easier, although shipments are coming in regularly from London and Singapore. The oil and lubricants markets were steady with a moderate demand in all products and with no changes during the entire week.

Daily Market Reports for the Past Week

Material.	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum	.25	.26	.26	.27	.27	.27	+.02
Antimony	.35	.34½	.34½	.34½	.34½	.35	.....
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	.....
Bessemer Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	.....
Copper, Elec., lb.	.18¾	.18¾	.18¾	.18⅞	.18⅞	.19¼	+.00½
Copper, Lake, lb.	.18½	.18½	.18½	.19	.19	.19½	+.01
Cottonseed Oil, bbl.	6.26	6.26	6.27	6.25	6.20	6.20	—.06
Cyanide, Potash, lb.	.24	.24	.24	.24	.24	.24	.....
Fish Oil, Menhaden, Brown	.41	.41	.41	.41	.41	.41	.....
Gasoline, Auto, bbl.	.12	.12	.12	.12	.12	.12	.....
Lard Oil, prime	.90	.90	.90	.90	.90	.90	.....
Lead, 100 lbs.	4.90	4.90	5.00	5.20½	5.20	5.60	+.70
Linseed Oil	.67	.67	.67	.67	.67	.67	.....
Open-Hearth Steel, ton	19.50	19.50	19.50	19.50	19.50	19.50	.....
Petroleum, bbl., Kans., crude	.40	.40	.40	.40	.40	.40	.....
Petroleum, bbl., Pa., crude	1.35	1.35	1.35	1.35	1.35	1.35	.....
Rapeseed Oil, refined	.85	.85	.85	.85	.85	.85	.....
Rubber, Fine Up-River, Para	.61	.61	.61	.61	.62	.62	+.01
Silk, raw, Ital.	3.90	..	3.90	..	..	3.90	.....
Silk, raw, Japan	3.42½	..	3.30	..	..	3.30	—.12½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	37.63	37.63	37.55	38.00	38.48	39.00	+1.37
Tire Scrap	.05	.04¾	.04¾	.04¾	.04¼	.04½	—.00½

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Eisemann's Business Gains 300 Per Cent. in 1914

NEW YORK CITY, June 4—During the fiscal year ending the last of this month the Eisemann Magneto Co. will show a gross business three times as large as in any other 1 year since its inception.

In addition to this condition the Eisemann company has under contract at the present time enough business for the coming fiscal year to double this last year's tremendous business.

The present plant in the Bush Terminal has been practically tripled during the past year. In spite of this fact more floorspace has been leased and is being occupied as rapidly as the new machine equipment can be installed.

In point of numbers the greatest output is the four-cylinder waterproof type G4 followed by the automatic spark control type and the waterproof GN, which is the six-cylinder model.

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S. O. Gasoline Price Dropped 1 Cent

CHICAGO, ILL., June 7—The Standard Oil Co. of Indiana today reduced the price of gasoline 1 cent to 8 1-2 cents for deliveries of 100 gallons at a time. The quotation for naphtha was lowered 1-2 cent to 8 cents for 100 gallons at one purchase.

This reduction has greatly surprised the trade here. All indications have pointed to further increases in gasoline prices during the current month in various parts of the country.

So far only New Jersey and vicinity have been affected by advanced prices, and these were made only where gasoline was selling at its lowest level.

Independent oil men say that they

have been advised of Standard's gasoline reduction only in Illinois and Indiana but the latter company states that it will take effect forthwith in the company's entire sales territory. The recent drop in crude oil prices, it is stated, is the cause of the reduction.

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S. G. V. Plant Being Sold in Separate Lots

READING, PA., June 9—The S. G. V. Automobile Co. plant in its entirety is being sold at absolute auction in separate lots, only to the highest bidder, without limit or reserve, for cash at the plant in this city. The sale started yesterday and will continue until everything is sold.

The plant, consisting of name, good will, patterns, drawings, jigs, dies and the right to continue the business will be offered; also the service department in its entirety, thirty-two complete chassis of the latest model 1915, 100 assorted up-to-date Quinby and Fleetwood bodies, a large quantity of radiators, etc.

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$1,000,000 Paid for Stevens-Duryea Automobile Plant

NEW YORK CITY, June 4—The New England Westinghouse Co. has deposited checks for the purchase of the J. Stevens Arms & Tool Co. and the Stevens-Duryea Automobile Co., Springfield, Mass., the price of the former concern being over $1,000,000 and of the latter $1,000,000. These plants were sold in the middle of May to the Westinghouse company to take care of a rush war order. After this order is taken care of the usual line of Westinghouse products will be manufactured at the plants. About 8,000 men will be employed.

Security Prices Higher

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Sturdy Demand in All Stocks—General Motors Makes High Record

NEW YORK CITY, June 7—Except for a few fractional declines, most of the stocks that changed made substantial gains in this week's security quotations. The upward sweep in the stock market last week was attributed to the resumption of the main upward movement which began some months ago as a result of the growing realization of the advantageous position that this country occupies in the financial and business world. Uneasiness over the German situation has been offset by evidence that the rise in stock prices was in the nature of an expression of this confidence rather than a mere speculative boom.

Securities this week were unusually higher. General Motors common featured the market with a 16-point rise, closing at 151, at an absolute high record. The strength of this issue was attributed to expectation of early dividend action. It is stated that the company will have a net profit for the fiscal period of more than $9,000,000, meaning a balance for the common of nearly 50 per cent.

Automobile stocks in general are at present in the limelight. Already many traders are looking to the time when stock of the Ford Motor Co. shall be listed on the Stock Exchange, though no indication has been given that it will.

Tire issues showed substantial gains, much higher than usual. Firestone common went up 10 points; Goodyear common, 4 points; Goodrich common, 3 1-2 points; Kelly-Springfield, second preferred, 15; Portage common and preferred, 3 points each; and U. S. Rubber common, 3 points.

The majority of the automobile stocks showed gains. Willys-Overland common rose 15 1-2 points while its preferred gained 1 1-2. Studebaker common went up 4 points.

The Detroit issues showed gains of from 1 to 10 1-2 points.

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Moon's May Business Shows 33.1% Increase

NEW YORK CITY, June 4—Reports from the Moon Motor Car Co., St. Louis, Mo., show that during April, 1915, the shipments and sales showed an increase of 24.7 per cent. over last year, and in May a gain of 33.1 per cent. over the same period last year.

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New Automobile Co. for Jackson

JACKSON, MICH., June 4—It is rumored that a new automobile manufacturing concern is in the course of organization here and that it will build a six-cylinder car at $800. A Detroit firm will make the power plant.

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Now Singleton-Tripp Co.

CLEVELAND, O., June 5—The Singleton-Tripp Co., general advertising agent in the Citizens Bldg., has succeeded to the business of the J. T. Singleton Co. W. H. Tripp was recently elected vice-president of the company.

Automobile Securities Quotations on New York and Detroit Exchanges

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ges
Ajax-Grieb Rubber Co, com.	220	..	300	..	..
Ajax-Grieb Rubber Co. pfd.	99	100	101	..	..
Aluminum Castings pfd.	99	100	98	100	..
J. I. Case pfd.	84⅞	90	..	80	..
Chalmers Motor Company com.	98	102	89	94	..
Chalmers Motor Company pfd.	94	96	95	98	..
Electric Storage Battery Co.	51	52	51	53	..
Firestone Tire & Rubber Co. com.	305	310	485	490	+10
Firestone Tire & Rubber Co. pfd.	107	110	110	113	..
General Motors Company com.	94	95	151	153	+16
General Motors Company pfd.	94½	95	99	100	+1
B. F. Goodrich Company com.	24	25	46½	48	+3½
B. F. Goodrich Company pfd.	88	89½	101	103	— ¼
Goodyear Tire & Rubber Co. com.	173	178	244	248	+4
Goodyear Tire & Rubber Co. pfd.	98	99½	105¼	106	+ ¼
Gray & Davis Inc. pfd.	95	102½	..	..	..
International Motor Co. com.	..	5	14	15	..
International Motor Co. pfd.	3	10	37	39	+3
Kelly-Springfield Tire Co. com.	..	..	129	132	..
Kelly-Springfield Tire Co. 1st pfd.	..	..	83	85	+ ½
Kelly-Springfield Tire Co. 2nd pfd.	..	..	130	135	+15
Maxwell Motor Company com.	14	14¼	46	47	+3½
Maxwell Motor Company 1st pfd.	42½	44	87	88½	+1
Maxwell Motor Company 2nd pfd.	17½	18	39	41	+2
Miller Rubber Company com.	..	..	180	185	..
Miller Rubber Company pfd.	..	..	104	105	..
New Departure Mfg. Co. com.	..	..	106½	..	..
New Departure Mfg. Co. pfd.	..	..	136	141	..
Packard Motor Car Co. com.	103	..	102	104	..
†Packard Motor Car Co. pfd.	98½	100½	96¼	..	..
Peerless Motor Car Co. com.	18	25	67	70	..
Peerless Motor Car Co. pfd.	..	62½	94	96	..
Portage Rubber Co. com.	..	40	35	38	+3
Portage Rubber Co. pfd.	..	90	85	88	+3
*Reo Motor Truck Company.	9½	10	15	16¼	+ ⅛
*Reo Motor Car Company.	20	22†	32¾	33¾	..
Splitdorf Electric Co. pfd.	40	50	..	..	..
Stewart-Warner Speed. Corp. com.	47	49	68	69	+4
Stewart-Warner Speed. Corp. pfd.	97½	99½	103	105	..
Studebaker Corporation com.	33⅜	34	71	72½	+4
Studebaker Corporation pfd.	87½	89	99	101	+1½
Swinehart Tire & Rubber Co.	73	80	80	90	..
Texas Company	146½	147½	128	130	+4½
U. S. Rubber Co. com.	58¼	58¾	65	66	+3
U. S. Rubber Co. 1st pfd.	102½	103	106	108	..
Vacuum Oil Company	226	229	204	208	+4
White Company pfd.	107	110	103	108	..
Willys-Overland Co. com.	74	75½	130	131	+15½
Willys-Overland Co. pfd.	92	95	101½	103½	+1½

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS.

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ges
Chalmers Motor Co. com.	101	105	..	92	+1
Chalmers Motor Co. pfd.	94	96¼	95	98	+1
Continental Motor Co. com.	..	180	180	200	+10
Continental Motor Co. pfd.	..	75	84½	86	+ ½
General Motors Co. com.	93	96	146	150	+10½
General Motors Co. pfd.	94¼	..	99	100	+1
Maxwell Motor Co. com.	14	14¾	43	46	+2
Maxwell Motor Co. 1st pfd.	42	44	86	88	+ ½
Maxwell Motor Co. 2nd pfd.	17	19	38	40	+1½
Packard Motor Car Co. com.	103	..	102	104	..
Packard Motor Car Co. pfd.	97	100½	96¼	..	+2¾
*Reo Motor Car Co.	18	..	32½	33½	— ¼
*Reo Motor Truck Co.	9½	10	14⅝	15½	..
Studebaker Corp. com.	..	..	67	69	+1
Studebaker Corp. pfd.	..	..	..	100	+1

INACTIVE STOCKS

*Atlas Drop Forge Co.	..	21	..	26	..
Ford Motor Co. of Canada.	..	550	950	..	..
Kelsey Wheel Co.	185	..	200	..	..
W. K. Pruden Co.	..	20½	19½	21	..
Regal Motor Car Co. pfd.	20	..	..	25	..

BONDS

General Motors, notes, 6s, 1915.	101	102	..	..	..
Packard Motor Co. 5s, 1916.	95	98½	98¼	..	..

* Par value $10; all others $100 par value. †Ex-dividend.

Prest-O-Lite Buys Battery Plant

Secures Pumpelly Factory with All Patents—To Use Present Service Depots

INDIANAPOLIS, IND., June 5—By purchasing the Pumpelly Battery Co. of this city, the Prest-O-Lite Co. has entered the electric lighting field and will carry on the manufacture of this battery under the new name of Prest-O-Lite battery and handle it through the wide chain of service depots through which it has marketed its gas tanks. James Allison, vice-president of the Prest-O-Lite Co., made the purchase of 50 per cent. of the Pumpelly stock, and by the deal Harry Murphy, who was president of the Pumpelly company, becomes vice-president of the Prest-O-Lite Co. and will be in charge of the new Prest-O-Lite battery department. Thus the Pumpelly personnel has been absorbed into the Prest-O-Lite organization.

Mr. Allison, at present vice-president and treasurer of the Prest-O-Lite Co., will continue to serve in that capacity with Mr. Murphy as an additional vice-president.

The Pumpelly company has been manufacturing storage batteries, starting, lighting and ignition systems, and has been shipping about 400 batteries a day for the past year. Officers of the Prest-O-Lite Co. declared that they intend to increase the scope of the business to become contenders in the electric lighting and starting field as well as in the gas lighting industry. Acquisition of the Pumpelly Battery Co. places the concern in a condition to compete in both fields, and the batteries will be manufactured for the present in the old plant of the Pumpelly Co., but buildings will be erected later at the Prest-O-Lite plant. Battery service stations and agencies will be maintained wherever Prest-O-Lite service is offered. The company has thirty-five factory branches and over 20,000 agencies.

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Overland Breaks Its Single Shipment Record

TOLEDO, O., JUNE 5—What is probably the largest single shipment of automobiles ever made leaves the Toledo factory of the Willys-Overland Co. on Friday. The entire shipment, which has a total valuation considerably in excess of one-third of a million dollars, is consigned to the C. T. Silver Motor Co., Overland distributor for New York. During the week ending May 29 shipments were made of 1906 cars from the Toledo plant. During the present week this will be exceeded by at least 100.

Reports from the company state that orders now on hand for immediate shipment are approximately 17,000 in excess of shipments. This is in spite of the fact that many departments of the factory are working both night and day in an effort to make the supply meet the demand. More than 9,200 men are now being employed at the Overland factory.

H. H. Hower, for the past eight years with the F. B. Stearns Co., is the latest Knight motor representative to join the forces of the Knight division of the Willys-Overland Co. He started his new duties June 1 as assistant to Joseph McDuffie, salesmanager of the Knight division. The division has acquired the services of L. T. Wagner, former manager of the Argonaut Motors Co., San Francisco, distributor for the Stearns and Pathfinder cars. Mr. Wagner will make his permanent headquarters at San Francisco.

—

Colby Plant Sold for $32,800

MASON CITY, IA., June 4—The plant of the Colby Motor Co., was sold on May 26 at a receiver's sale for $32,800 to Allan Beck, of Beck-Walker Co., this city. The sale included five buildings comprising office and factory and much personal property, such as 100 radiators, 100 frames and other items including steering gears, windshields, springs, etc. About 7 acres of land were included in the sale. S. A. Schneider was the receiver. The probabilities are that the plant will be converted into separate factory buildings. Just what will be manufactured has not as yet been decided upon.

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Fedders' Radiator Factory Addition

BUFFALO, N. Y., June 3—A four-story addition to the Fedders Mfg. Co. plant will be ready for use the latter part of July.

Concurrently with the occupation of the new addition the company will bring out a new patented type of radiator. This radiator is claimed to be the lightest in weight of any radiator built and very simple to manufacture. The reports of the company show that it is turning out 50 per cent. more material at this time than it has done in the history of the organization and in order to keep up with the shipping it is working a complete night shift.

—

French Continental Tire Factory Has $100,000 Fire

PARIS, FRANCE, May 19—A fire, causing damage valued at $100,000, has destroyed all the upper portion of the main building of the Continental Tire Co.'s French factory, in the suburbs of Paris. The fire broke out on Sunday evening on the top floor of the building. In the building where the fire originated large stocks of raw rubber were kept; as there were no electric wires in this portion of the building and no workpeople were present, the cause of the fire is so mysterious that experts are investigating.

As soon as the war broke out the Continental company's factory was seized by the French authorities; the company's offices and store rooms in Paris had been closed the previous day prior to the departure of the staff for Germany, or the concentration camps.

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Burd Increases Capital $150,000

ROCKFORD, ILL., June 4—At a special meeting of the stockholders of the Burd High Compression Ring Co., held at its office in Rockford, Illinois, on May 19, it was voted unanimously to increase the capital stock of the company from $50,000 to $200,000.

The additional capital was voted for the purposes of adding to equipment, and enlarging the business.

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Federal Rubber Running Overtime

MILWAUKEE, WIS., June 4—The Federal Rubber Mfg. Co., this city, has added 700 men to its force since the opening of spring. The plant is running overtime, and the total working force is 1,700 men.

About 60 per cent. of its product is automobile tires, and 40 per cent. mechanical goods. The company recently purchased 6 acres just north of its present plant, with a view to possible expansion. It is said to be contemplating the erection of a large factory building.

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Champion Ignition to Add

FLINT, MICH., June 4—The Champion Ignition Co., Flint, Mich., manufacturer of A C, A C Titan and A C Cico spark plugs, has given a contract for a building which will give it an addition of 18,000 square feet. It is lining up now for an output of 50,000 plugs a day.

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Double Recovery in Compensation Act

TRENTON, N. J., June 7—The Supreme Court today held that under the New Jersey Workmen's Compensation act, a man hired in New Jersey and hurt in Pennsylvania, can recover compensation in both states.

The case was that of a brakeman on the New Jersey Central, against that railroad. He was hurt at Odenweiler, Pa. The lower court held the Federal Employers' Liability law prevented the applicability of New Jersey's compensation act.

The supreme court upheld the contention and also said recovery in two states is no more unjust than recovery upon two policies of accident or life insurance.

With this decision comes the announcement that workmen's compensation has been admitted into Pennsylvania, effective January 1, 1916.

To Abolish Florida State Tax

Counties to Sell License Tags—Fees Graduated on Seating Capacity of Car

TALLAHASSEE, FLA., June 7—Senator Igou's automobile license bill, completely changing the system now in vogue in Florida of registering automobiles at the state capital, having passed both the house and the senate of the general assembly, awaits only the signature of Governor Trammel to become a law.

The present law, which was recently upheld by the high courts, charged a $3 state tax and allowed taxation for license in counties also.

The new law abolishes the state registration, and provides for the sale of license tags in the different counties. The county license is graduated on the seating capacity of the automobile. A motorcycle license will be $2.

25 Miles Legal in Wisconsin

MILWAUKEE, WIS., June 5—Wisconsin limits of 15 miles per hour in cities and 25 miles per hour in country districts have been permitted to stand by the Wisconsin legislature. A movement to reduce country speeds to 20 m. p. h. was effectively opposed by the motor clubs. The 8-mile limit when passing school grounds is enlarged to include county or state hospital or poor farm grounds and cemeteries. The following acceptable provision is retained:

"No person shall operate or drive any automobile, motor cycle or other similar motor vehicle recklessly or at a rate of speed greater than is reasonable and proper, having regard to the width, traffic and use of the highways and the general and usual rules of the road, or so as to endanger the property, life or limb of any person....."

The provision which prohibits any county, city, village or town from passing or enforcing any law or rule in contravention to the state statute is retained. This insures uniform motor legislation throughout Wisconsin for 2 years more.

Wins Car Guarantee Suit

INDIANAPOLIS, IND., June 7—An interesting decision regarding guarantees on motor cars has just been handed down by the Indiana supreme court in affirming a decision of the lower court awarding $6,500 damages to the Indianapolis Motor Car Co. against the Hart-Kraft Motor Co., Philadelphia.

The local company held an agency for Hart-Kraft trucks. It alleged that it lost considerable money under a maintenance contract under which the trucks were sold. It alleged the trucks were wrong in principle of construction and that its damage was greater than that covered by the written guarantee issued by the company manufacturing the trucks.

Safety First Recommendations

DETROIT, MICH., June 4—The committee of the Safety First Federation of America, which assembled here today, decided to present recommendations embodying the following important rules and regulations to the first annual convention of the federation which is to be held in this city in October: Adoption of a standard plan for traffic lanes for pedestrians; licensing of drivers of all motor vehicles; standard signals for all traffic work; standard ordinance covering traffic regulation; standardization of all accident reports by municipalities; standardization of left-hand turns at street intersections; standard size, color and attachment for all traffic signs; fixed location for traffic officers; uniform instruction in the education of traffic officers; time limit of from 15 minutes to 1 hour for automobile parking; near-side stops for street cars; guards on all chain-driven motor trucks; abolition of all steps on horse-drawn and motor trucks; laws giving police power to control pedestrian traffic; exclusive use of siren for police and fire vehicles.

Hearing on Georgia Law June 12

SAVANNAH, GA., June 4—State Attorney General Warren Brice will represent the state at the hearing on the automobile registration law to be held here June 12. The hearing is on a temporary injunction granted in the Superior Court of this county restraining the city from requiring automobilists to register with the clerk of the council and temporarily preventing the state from collecting the $5 registration fee.

Chicago-to-Seattle Relay Run

CHICAGO, ILL., June 8—To prove that every mile of the route from Chicago to Seattle, Wash., is in condition for touring, officials of the Yellowstone Trail Assn. will hold a relay motor run over the transcontinental highway next week. Twenty-one cars will participate and the trip from Chicago to Seattle will be made in 100 hours, driving day and night to cover the 2,439 miles on schedule.

Detroit Piston Ring Co. in New Home

DETROIT, MICH., June 4—The Detroit Piston Ring Co., has moved into a new one-story building 60 by 125 feet located at Richmond avenue and Custer. In this new home the company has over five times as much floorspace as in the old building and will increase at once its production facilities by adding considerable new machinery and employing about fifty men. The concern started in business about 2 1-2 years ago and is making piston rings exclusively. Since January business has been over 100 per cent. better than during the first 6 months of 1914.

Pennsylvania Tire Guaranteed Up to 6,000 Miles

NEW YORK CITY, June 4—The Pennsylvania Rubber Co., Jeannettte, Pa., has increased its guaranteed mileage from 4,500 to 6,000 miles on all its oil-proof vacuum cup tires. This will apply also to all vacuum cup tires at present in service. This announcement follows logically the result of The Automobile Club of America official test, in which nine tires on heavy cars averaged 6,760 miles, three of them exceeding 8,900.

Maxwell Finishes 10-Day Test

LOS ANGELES, CAL., June 3—The Maxwell 25 belonging to the Lord Motor Car Co., local dealers, which has made a round trip a day for 10 consecutive days between Los Angeles and San Diego, completed the run, a total of 2,764 miles, according to schedule. This car carried as passengers free on each trip, three outsiders. Most of the trips were made in less than 6 hours, four of the runs averaging more than 24 miles per hour for the 138 miles.

Young Blood in Goodyear

AKRON, OHIO—In carrying out the announced policy of distributing common stock to young partners in the company, the Goodyear Tire and Rubber Co., this city, has filed papers with the secretary of state increasing its authorized capital from $8,000,000 to $25,000,000. Only part of the increased capital will be distributed at this time, the remainder being kept in the treasury for future contingencies.

Detroit License Office Closed

DETROIT, MICH., June 8—Beginning July 1 the local office of the Secretary of State will be closed and all automobile licenses will again be issued and sent from the offices of the secretary in Lansing, Mich.

The announcement has caused quite a stir among manufacturers, dealers and owners, as it will cause much delay.

Monarch Buys 5,000 Advance Pumps

DETROIT, MICH., June 8—Harry H. Knipper, manufacturers' representative, has sold to the Monarch Motor Car Co., 5,000 Advance air pumps, made by the Advance Machinery Co., Toledo, O.

350-Mile Race for Sheepshead

Work on Track Progressing—Part of Concrete Foundation Finished

NEW YORK CITY, June 4—The inaugural meet at the Sheepshead Bay track on October 2 will be featured by a 350-mile race. It was the consensus of opinion of the officials that a race of 350 miles would be long enough to test to a reasonable and satisfactory limit the endurance of the cars.

Work on the track is fast progressing. A mile and a quarter of the concrete foundations has been finished and a 1-4 mile of the board surface has been laid. The portion completed shows as smooth as a bowling alley. The boards have been dipped in creosote so that the track presents a dark brown surface.

Foundations for the grandstand are being put in and the steel is on its way. With the working forces increased to 1,500 men, construction is progressing to such an extent that the management is confident that the speedway will be finished by September on schedule time.

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Rayfield Offers $1,000 Prizes

CHICAGO, ILL., June 8—Findeisen & Kropf Mfg. Co., maker of Rayfield carbureters, has offered the following cash prizes to the winning cars in the 500-mile Chicago Speedway race if equipped with Rayfield carbureters. First, $500.00; second, $300.00; third, $200.00. In addition the company is offering a $1,000.00 solid silver punch bowl to the driver first winning the 500-mile race twice in a car fitted with a Rayfield carbureter.

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Waterloo, Ia., to Have Speedway

WATERLOO, IA., June 3—The Waterloo Speedway Assn. of this city, has filed incorporation papers with a capitalization of $250,000, to build and maintain an automobile speedway at Elk Run.

The present officers of the association are: President and treasurer, W. H. Hanna; vice-president, F. W. Porterfield, and secretary, A. C. Savage.

These three with F. J. Dains and Otis Higdon, constitute the present board of directors.

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Moross and Sloan Outlaws

NEW YORK CITY, June 7—The contest board of the American Automobile Association today stated that by reason of their participation in an unsanctioned mile track meeting at Detroit, Mich., May 30 and 31, the cars, drivers and mechanicians of the Moross and Sloan teams, the promoters and all officials connected with the meet, have automatically rendered themselves ineligible, under the provisions of Rule 58 of the contest rules, for participation in or connection with future events sanctioned by the American Automobile Assn. A definite period of suspension will be fixed at the next meeting of the contest board, to be held June 22.

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Tacoma Has Sixteen Entries

TACOMA, WASH., June 3—To date sixteen entries have been received for the Tacoma speedway races July 4 and 5. The last four entries are:

Marmon	Harry Reynolds
Mercer	H. D. Stratton
Gordon-special	Frank Elliott
Schneider-special	S. Schneider

—

Des Moines to Build Speedway

DES MOINES, IA., June 4—A 10-year lease for the Des Moines mile board automobile speedway has been accepted. The speedway will be located on the old Bennett farm at Valley Junction and will be known as the Des Moines Speedway.

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Six Franklins Average 32.55 M.P.G.

BROOKLYN, N. Y., June 5—To demonstrate the mileage which could be secured by a Franklin car owner, A. G. Perretz and Gilbert B. Perkins, Franklin dealers, conducted an owners' 1-gallon test today. There were six entries. The course was 17 miles eastward on Long Island from the Long Island Automobile Club and return, after which any additional mileage was run off in Brooklyn.

The highest mileage was made by F. F. Koehler, Jr., who went 39.2 miles before the supply in his little auxiliary tank was exhausted. The other mileages were: F. H. Evans, 33.5; Dr. Nathan T. Beers, 33.2; Rufus T. Humphrey, 33; Peter B. Hanson, 29; Dr. W. Ross Martin, 27.3. The average was 32.55. The winner was awarded an engraved silver cup.

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Wilson Truck on 30-Day Test Run

DETROIT, MICH., June 5—The J. C. Wilson Co., which makes the Wilson truck, will start a 30-days' test run with a 2-ton model in a week or 10 days. The daily run will be of 100 miles, some days in Detroit and other days in the vicinity.

Secretary Stanley Wilson of the company started today on an extensive business tour in the interest of his concern. He will gather first-hand information as to the truck business in the Middle West, Northwest and California by calling on the principal truck dealers and distributors. Among the important cities Mr. Wilson will visit are Omaha, Neb., Minneapolis, Minn., Denver, Colo., Salt Lake City and Ogden, Utah.; Los Angeles, San Diego and San Francisco, Cal.; Seattle and Tacoma, Wash.

Free Emergency Tire Service

Straus System Sends Help to Stranded Motorists—Cost of Tire Only Charge

INDIANAPOLIS, IND., June 4—The final word in tire service has been inaugurated here by the Straus service system, which in addition to maintaining a large store where stocks of casing and tubes are carried and where all kinds of repair work is done day or night, has a fleet of five free service cars, three Fords, an American and a Stoddard that cover a radius of 20 miles from the city and carry casings, tubes, gasoline and do tire changing as necessary. No charge is made for this service other than by way of new tubes or casings sold, or the price charged for repairs, and it is further claimed that all prices are on a par with those used in this city.

The working out of the system, which was only opened last week, is interesting. Should a tourist become stranded 18 miles out of the city for need of a casing he phones the Straus concern and immediately a man in a Ford starts out with the casing and perhaps an extra tube. This man makes the tire change, collecting only the cost of the casing. He carries in the car a large air tank capable of inflating five or six tires.

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Chalmers Managers Meet

DETROIT, MICH., June 7—Presided over by President Hugh Chalmers, the trimonthly convention of the district managers of the Chalmers Motor Co. started this morning. All the officials of the company were present and during the next few days there will be morning and afternoon sittings of the convention at which matters pertaining to the 1916 season will be fully discussed.

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Chalmers to Give 100 Hours' Service

NEW YORK CITY, June 7—A new service system has been inaugurated by the Chalmers Motor Co., Detroit, Mich. This system will give 100 hours' free service with the sale of every Chalmers car. The company is issuing a book of labor coupons that will be negotiable at any one of the 800 Chalmers service stations.

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N. Y. Perfection Spring Service Branch

NEW YORK CITY, June 7—The New York Service Branch of the Perfection Spring Co., 243-245 West 64th street, which is the second service branch to be established by this concern, will within 30 days be prepared to take care of all forms of spring repairs, including tem-

pering and resetting, and by that time will have a complete set of furnaces and equipment for such work. A. C. Bergmann, service branch manager, who was formerly connected with Simplex, Fiat and Mercer, has completed the installation of equipment to make it possible to change a spring in 1-2 hour and already the service department is completely stocked with springs for different makes of cars covering models as old as 1909 and in some cases older types. By the fall the new building will be occupied which will be a three-story structure 75 by 100 and located at 610 West 56th street. The first service branch of the Perfection Spring Co., was opened in Cleveland a year and a half ago and it is expected that others in addition to the New York one will be opened in the near future.

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300 Hupp Dealers Discuss Business on Lake Trip

DETROIT, MICH., June 4—Three hundred dealers, subdealers, distributers and members of the organization of the Hupp Motor Car Co. disembarked from the steamer City of Alpena II today after having spent 4 days on Lake Huron as guests of the concern on the occasion of the annual dealers' convention, at which the new models for 1916 were shown and matters pertaining to selling were discussed.

The cruise began at 3 p.m. June 1 and the itinerary included stops at the Soo, Mackinac island and Alpena. Hupmobile dealers from all parts of the United States and Canada were in attendance.

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Studebaker Gains 100 per Cent. in East

DETROIT, MICH., June 8—Sales Manager L. J. Ollier, of the Studebaker Corp., after an investigation trip through New York, Pennsylvania and New England reports conditions exceptionally good.

"I found everywhere a most optimistic condition," says Mr. Ollier, "not only in the automobile business, but in most all other lines of business. Compared with a year ago in those territories our business shows an increase of over 100 per cent., and in some instances, dealers and distributors have done 200 per cent. better. Sales have not only increased in the cities and towns, but out in the farming districts the demand has been and is stronger than ever. This increasing demand for motor cars applies as well to the commercial car as to the passenger vehicle."

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Anderson Dines Hupp Men

DETROIT, MICH., June 5—The members of the sales force of the Hupp Motor Car Co., were entertained today at dinner at the Detroit Athletic Club by sales and advertising manager Lee Anderson.

Jitney a Public Utility

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Illinois Puts It Under Utilities Commission Jurisdiction—Local Regulation

SPRINGFIELD, ILL., June 5—The jitney bus has been formally classified. It is now a public utility in Illinois. Henceforth in this state, its status is fixed and it must operate according to hard and fast rules, and regulations. No longer may it be a free agent, operating today and laying off tomorrow. It is now under the jurisdiction of the state public utilities commission. It must have fixed charges and fixed schedules for service. It must receive permission to operate and this permission can not be granted unless it is shown that its service is needed and that it promote the convenience of the public. The ruling of the commission was made following a petition filed by the Jacksonville street railway company, against the L. F. O'Donnell jitney bus company of that city, requiring the latter to comply with the utilities act. In line with the policy of the commission, certificates of convenience and necessity for jitney bus lines will not be granted where it is the intention to operate the lines parallel with the street car lines. The commission also holds that regulation by the utilities commission does not prevent additional regulation by city ordinance. It is maintained that this ruling gives the jitneys the worst jolt received in any state of the Union. In order to obtain a certificate of convenience and necessity the operators of jitney buses must incorporate under the state laws and must come to the commission with proper credentials showing that the city is willing to have them operate.

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Jitneys Lose in Springfield, Mo.

SPRINGFIELD, MO., June 4—Jitney owners here this week lost their fight against the enforcement of an ordinance for the regulation of jitneys. The court refused to enjoin the city officials from enforcing the ordinance, with the exception of three minor clauses. As a result jitney owners here will be required to obtain liability insurance bonds for $2,000, to stop at all railroad crossings, and to limit their speed to 15 miles an hour in the residence district, a lower speed than allowed trolley cars.

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Jitney Men Win in Savannah

SAVANNAH, GA., June 5—Holding that "some of the provisions in the ordinance under consideration are reasonable and beyond criticism, others are beyond reason and prohibitory," Judge Charlton, in a decision handed down to the supreme court, granted a temporary injunction restraining the city from enforcing the ordinance relating to the operating of jitney buses. Under this decision the jitneys may operate in Savannah free from municipal regulation except as provided in ordinances already in effect. The jitney ordinance is practically invalidated and rendered inoperative. The court order applies to all of the jitney injunction suits that have been filed.

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Common Carriers in Georgia

ATLANTA, GA., June 8—*Special Telegram*—The Georgia Railroad Commission today handed down a decision holding that jitney buses are common carriers under the Georgia statute and as such, are subject to regulation by the Commission. The Commission issued a set of tentative regulations by which the operation of jitneys will be guided until July 13, when criticisms will be heard upon these rules for the purpose of arriving at just and reasonable regulations.

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Pennsylvania Cities Can Regulate

PHILADELPHIA, PA., May 5—The cities in Pennsylvania are empowered to regulate jitney movements since the Patton bill has been approved. The bill provides that cities may regulate motor vehicles not operated on tracks and impose reasonable license fees and make regulations for the operations of the vehicles, as well as the rates to be charged.

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$2,500 Bond in Fort Worth

FORT WORTH, TEX., June 4—The amended jitney ordinance requires an indemnity bond of $2,500, payable to the mayor to cover injuries to passengers or pedestrians. The costs of the bond will be $250 a year. The original requirement was a $10,000 insurance policy at a cost of $70 yearly. The jitney men will contest the amendment at Hornaday.

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Washington Jitneers Abandon Fight

SEATTLE, WASH., June 4—Jitney bus operators have abandoned their fight against the state law which compels them to furnish a $2,500 bond before the state will issue a permit for their operation.

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Jitneys Lower Hartford Trolley Earnings

HARTFORD, CONN., June 5—April of this year marked a big drop in the earnings of the Connecticut company, the trolley subsidiary of the New York, New Haven & Hartford railroad, and it was all due to the jitneys. A loss of $40,753 is reported for the month of April as compared with the same period a year ago.

Factory Miscellany

Auto Wheel to Add—The Auto Wheel Co., Lansing, Mich., is to build an addition 60 by 160 feet to its plant.

Autocar Co. to Add.—The Autocar Co. Ardmore, Pa., will add a three-story building to its factory. It will be of brick and concrete construction.

Locomobile Adding—The Locomobile Co. of America, Bridgeport, Conn., will erect a one-story building, 50 by 60 feet, for a case-hardening department.

Firestone Plant in Kansas City.—The Firestone Tire & Rubber Co., Akron, O., has purchased a site on Grand Ave., Kansas City, Mo., and will construct a plant.

Automobile Plant for Duluth—C. E. Kling is behind a project to construct a plant for the manufacture of automobiles at Duluth, Minn. The estimated cost is $250,000.

To Mfr. Tires.—The Standard Four Tire & Rubber Co. plans to construct a plant at Des Moines, Ia., for the manufacture of automobile tires. The estimated cost is $100,000.

To Mfr. Carbon Remover.—The Orolo Carbon Remover Co. is the name of a new concern located at 914 North High street, Columbus, O., for the manufacture of a carbon remover and engine cleaner.

Old Columbia Plant Being Reconstructed—Plans of the reconstruction of the Columbia Motor Car Co., Hartford, Conn., plant recently purchased by the Billings & Spencer Co. and which will eventually house all branches of that concern's business are are progressing. The old forge shop has been rebuilt and a similar new addition is now under construction.

Hamilton Lock Secures Plant.—The Hamilton Lock, Nut & Specialty Mfg. Co., Hamilton, Ont., has secured a factory on Gage Ave., Hamilton, and will manufacture a patented lock nut and an automobile wheel. W. J. Sutterby is superintendent.

Twentieth Century Packing Plant in Detroit—The Twentieth Century Metallic Packing Co., recently organized in Lexington, Ky., to manufacture automobile specialties, will locate its plant in Detroit, Mich., it is stated. E. J. Welch, of Detroit, is the head of the concern.

Faultless Contract for Addition Awarded.—The contract for the erection of two wings to the plant of the Faultless Rubber Co., Massillon, O., has been awarded. One of the wings will be 50 by 50 feet and the other 60 by 180 feet, both two stories high.

Beautifying Sheldon Plant Surroundings.—A large force of men is busily engaged in beautifying the grounds surrounding the plant of the Sheldon Axle & Spring Co., at Wilkes-Barre, Pa. The work is being done for the company under the direction of the Superintendent of Parks and Grounds of the City of Wilkes-Barre, and will be laid out along the same lines that the commissioners have adopted in the public grounds and parks throughout the city.

Goodyear Rewards Suggestions.—The Goodyear Tire & Rubber Co., Akron, O., in its efforts to attain the utmost efficiency, has inaugurated a "Suggestion System" whereby employees with ideas concerning possible improvements upon existing methods may bring them to the attention of the management, and, if adopted, receive suitable reward. There has been a general response to this offer and many employees have received the company's check for their ideas.

Republic Truck Stays in Alma—The Alma (Mich.) Board of Trade has voted to raise and spend $35,000 for a new building for the Republic Motor Truck Co., and as a result this concern will remain in that city instead of going to either Kalamazoo or to Saginaw. The company is employing 300 men at present and is working two shifts of 12 hours each in the machine shop and 3 hours overtime in other departments for 5 nights out of the 6. Last month the company turned out 242 trucks and shipped the entire amount. At present the concern is about 100 cars behind on orders.

St. Louis Co. Buys Plant.—The officers of the All-Steel Motor Car Co., St. Louis, Mo., and a committee representing the citizens of Macon, Mo., have closed a deal in the latter city by which the automobile concern acquires possession of the large Blees buggy plant for the manufacture of its cars. The company will install machinery and put a force to work at once. It is planned to make two types of cars. One is the roadster selling for $350 and the other will be a five-passenger touring car to sell for $410. The initial factory force will be about 800.

The Automobile Calendar

June 11-12.....Effingham, Ill., Hillclimb and Fuel Economy Test. Salt Creek Hill, Effingham Automobile Club.
June 12.....Brighton Beach, Track Race; E. A. Moross.
June 14.....San Antonio, Texas, Jitney Convention.
June 14-17.....Detroit, Mich., Summer Meeting of the Society of Automobile Engineers and Start of Cruise to Georgian Bay.
June 15.....Peoria, Ill., Track Race, 100 Miles, National Implement and Vehicle Show.
June 15-17.....Chambersburg, Pa., Run to Atlantic City.
June 19.....Chicago, Ill., 500-Mile Race, Chicago Speedway.
July 3.....Utica, N. Y., Hill Climb, Automobile Club of Utica.
July 3.....Sioux City, Ia., 300-Mile Race, Sioux City Speedway Assn.
July 4.....Visalia, Cal., Road Race; Tulare County Automobile Assn.
July 4-5.....Tacoma, Wash., Road Race, Tacoma Speedway Assn.
July 5.....Omaha, Neb., Speedway Races, Omaha Motor Speedway.
July 5.....Visalia, Cal., Road Race, Tulare Co. Auto. Assn.
Aug.....Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.
Aug. 2-3.....San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.
Aug. 20-21.....Elgin, Ill., Road Races.
Sept.....Indianapolis, Ind., Fall Show, Indiana State Fair.
Sept.....Peoria, Ill., Second Northwestern Road Congress.
Sept. 6.....Providence, R. I., Speedway Race; F. E. Perkins.
Sept. 6.....Detroit, Mich., Speedway Race; Detroit Speedway Club.
Sept. 8-11.....Hamline, Minn., 2-Day Meet at State Fair Grounds between Minneapolis and St. Paul, State Fair.
Sept. 13.....Oakland, Cal., Pan-American Road Congress.
Sept. 17-18.....Peoria, Ill., Illinois Garage Owners' Assn. Convention.
Sept. 20-25.....San Francisco, Cal., International Engineering Congress.
Oct.....St. Louis, Mo., Show, Forest Park Highlands, St. Louis Automobile Manufacturers and Dealers' Assn.
Oct. 1.....Minneapolis, Minn., Track Race, Twin City Motor Speedway Co.
Oct. 1-2.....Trenton, N. J., Track Races; Inter-State Fair.
Oct. 2.....New York City, Sheepshead Bay Motor Speedway Track Meet.
Oct. 6-16.....New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace.
Dec. 31.....New York City, Show; Grand Central Palace.
Jan. 22, 1916.....Chicago, Ill., Show; Coliseum.
March 4-11.....Boston, Mass., Truck Show, Mechanics Bldg.

The Week in the Industry

Reese Oakland Buick Manager—C. M. Reese has been named manager of the Buick branch in Oakland, Cal.

Kriedeman Superintendent — The Standard Motor Truck Co., Detroit, Mich., has appointed C. C. Kriedeman as superintendent.

Alvan Resigns—F. J. Alvan, who was general sales manager of the Sears-Cross Speedometer Co., Detroit, Mich., has resigned and will start in business for himself.

Hagerling Succeeds Dill.—L. H. Hagerling, former manager of the Packard agency at Harrisburg, Pa., has succeeded I. W. Dill of the Hudson Sales Agency.

Berry Now Sales Manager—P. A. Berry, for the past two years connected with the Pacific Car Co., Tacoma, Overland distributor, has been promoted to sales manager.

O'Neil Sales Mgr.—A. L. O'Neil, for about 7 years in the automobile business in St. Louis, has joined the forces of the Von Arx Automobile Co., Winton distributor, as sales manager.

Phillips Baltimore White Manager—T. C. Phillips has been made the Baltimore, Md., manager of the White branch. For six years Mr. Phillips was with the Pittsburgh branch of the concern.

Hallowell Resigns.—Montgomery Hallowell, publicity man for Briscoe Motor Co., Jackson, Mich., has resigned to accept a position in the advertising department of the *New York Times*.

Morarity Makes Change. — M. G. Morarity, of Des Moines, formerly manager of the C. F. Stewart Automobile Co., has become sales manager for the Miller Motor Car Co., of Waterloo.

Crumley Joins King—A. A. Crumley, late eastern district sales manager for the Hudson Motor Car Co., has joined the King Motor Car Co. in a similar capacity. His headquarters will be in New York City.

Gilbreath Resigns—W. S. Gilbreath has resigned as secretary of the Hoosier Motor Club at Indianapolis in order to go to Chattanooga, Tenn., where he is to become field secretary of the Dixie Highway Commission.

Cutting Heads Kissel Truck Dept.—Ned Cutting has been placed in charge of the commercial vehicle department of the Pacific coast branch of the Kissel Motor Car Co. His headquarters are in Los Angeles, Cal.

Moter Men in New Roles

Link Joins Standard Truck—Vincent Link, for several years truck engineer for the Packard Motor Car Co., has taken charge of the engineering and drafting departments of the Standard Motor Truck Co., Detroit, Mich.

Jones Heads New Co.—A. H. Jones, formerly manager for Ballou & Wright, accessory dealers in Seattle, Wash., is now at the head of the Pacific Auto Supply Co., and C. E. Barteau is vice-president and sales manager.

Dike Resigns—R. W. Dike, a locomotive engineer, who established a garage, agency and repair shop under the style of Osceola Motor Car Co., Osceola, Wis., last fall, has resigned his position to take personal charge of the business.

Wilkins Transferred.—F. W. Wilkins, formerly in charge of the Maxwell Service station in Winnipeg, Man., has been transferred to the sales department and given charge of the Saskatchewan branch, with headquarters at Regina.

Logan Empire Manager.—R. L. Logan has been appointed manager of the branch recently established in Pittsburgh by the Empire Rubber & Tire Co., Trenton, N. J. Formerly he was connected with the National Cash Register Co.

Moran Heads Tire Branch—The Southern Tire & Rubber Co., of Augusta, Ga., has announced the opening of a branch in Atlanta, under the charge of O. A. Moran. The branch is located at 225 Peachtree street, in the heart of what is known as "Automobile Row."

Strobridge Resigns. — George Strobridge has resigned from his position of chief examiner of chauffeurs in the office of the Secretary of State of New York State and will henceforth conduct the Strobridge Automobile School, at 1989 Broadway, New York City.

Maxson Heads New Overland Co.—A new corporation, known as the Overland-Hartford Co., Hartford, Conn., succeeds the Overland-Connecticut Co., throughout the state of Connecticut with the exception of most of Fairfield county. Irving F. Maxson, an Overland factory man, heads it.

Wing Heads Metz Branch—F. L. Wing has been appointed manager of the Southern California Metz branch, Los Angeles, succeeding E. H. Metz, son of C. H. Metz, president of the Metz company at Waltham, Mass. The former manager returns to Waltham to assume the duties of an appointment higher up in the company's service.

Savage Tire Changes — A recent change on the force of the Savage Tire Co. in California is the promotion of M. L. O'Brien, formerly sales manager at San Diego, Cal., to assistant to Claus Spreckles, secretary of the company. H. H. Eitzen, formerly assistant manager, has been made manager of the San Diego branch.

Bender Goes to Overland.—J. L. Bender, formerly of Timken-Detroit Axle Co., and American Ball Bearing Co., and recently sales manager of Grant-Lees Gear Co., Cleveland, has been appointed distributor of the Overland product in central Pennsylvania. Bender has acted as district manager in central Pennsylvania for the past year. He will take headquarters at Altoona.

Colver Heads Brooklyn Maxwell.—The New York City branch of the Maxwell Motor Sales Corp. has opened a Maxwell branch in Brooklyn at 1392 Bedford avenue, corner of St. Mark's avenue. Fred Colver has been appointed manager of the Brooklyn end of the business.

Franklin Appointed Mgr.—H. E. Franklin, who has been identified with the Chase truck line in Los Angeles for the past 4 years, has been appointed manager of the truck department of Hawley, King & Co., newly appointed Southern California and Arizona agents for the Chase line. The company also handles the National, Oakland and Saxon lines in the local field, covering the same territory. The Chase factory formerly operated a factory branch in this city under the management of C. J. Batcharie. The new agents have established a service station on Central avenue.

Ellwood Joins Nordyke & Marmon—A. L. Ellwood has been appointed manager of Kansas City branch of the Nordyke & Marmon Co. Mr. Ellwood has been with the Marmon company a short time as territorial representative, and before joining them was connected with the Locomobile Co. of America as St. Louis branch manager and later as Chicago branch sales manager. The territory controlled from Kansas City has been enlarged and will embrace the entire state of Kansas, Western Missouri, Oklahoma, Southern Nebraska, and Southwestern Iowa. Mr. Ellwood succeeds W. F. Seigmund.

Recent Incorporations in the Automobile Field

California

LOS ANGELES—Auto Truck & Drayage Co.; $75,000. T. W. Sims and others.

Canada

EDMONTON, ALTA.—The Jitney Bus Co., Ltd.; $30,000. The incorporators have not as yet been named.

BERLIN, ONT.—Canadian Regal Motor Co., Ltd.; $100,000; to manufacture automobiles and parts, motor trucks, cycles, tricycles, motors, etc.

GUELPH, ONT.—Guelph Tire & Rubber Co.; $350,000. A. H. Davidson, T. N. Dunn and A. Orr.

Colorado

COLORADO SPRINGS—Colorado Springs Auto Equipment Co., to handle motor cars accessories; $25,000. S. T. Mccollum and S. E. Howe, Jr.

Illinois

BLUE ISLAND—Blue Island Garage; $2,500; automobile business and accessories, repairing, storing and garage. Christian Krueger, Louis D. Johnson, Charles A. Voss.

CHICAGO—Automobile Engineering Co.; $2,500; manufacturing of improvements in gas engines, motor cars, etc. Charles S. Frank, Ed. H. Foster, James Fawkner.

CHICAGO—Continental Motor Truck Co.; $2,500; buy and sell automobiles, auto trucks, etc. H. K. Gilbert, George N. Sargent and E. G. Dunbar.

CHICAGO—Fort Dearborn Sales Co.; $250. Carl W. Kellman, E. E. Kellman and E. V. Culver.

CHICAGO—Monarch Motor Parts Co.; $2,000. John W. Follmer, Anna Brinkman and Clarence A. Samuels.

CHICAGO—Motor Aid Co.; $60,000; manufacturing and dealing in auto parts and accessories. F. B. Smith, G. K. Strong, A. W. Strong.

CHICAGO—Olsese Motor Car Co.; $2,500; manufacturing and dealing in automobiles, parts and accessories. C. W. Olsese, W. D. Belton, A. R. Bales.

CHICAGO—Tempco Manufacturing Co.; $25,000; manufacture and sale of automobiles, accessories, etc. Frank Templeman, Carl J. Sharp.

PEORIA—The Grand Auto Co.; $10,000; to deal in automobiles and automobile repairing. J. Shirley West, William J. Cook, Lois J. Schultz and Clarence A. Ullman. The office of the company is at 314-16 Fayette Street.

MT. VERNON—The Mount Vernon Machine & Motor Co.; $15,000. D. P. Settlemire, L. E. Mayfield and Robert C. Smith.

ROCKFORD—Eureka Ball Bearing Co.; $10,000; to manufacture and sell at wholesale, ball bearings and to manufacture other automobile accessories. Frank Vander Bogar, A. J. Christianson and William M. Rohn.

Indiana

CRAWFORDSVILLE—Crawfordsville Rubber Co.; $5,000; to deal in rubber goods. C. A. Westfall, H. B. Coats and W. M. White.

CONNORSVILLE—The Lexington-Kansas City Co.; $5,000. Arthur Dixon, Emery Huston and F. I. Barrows.

INDIANAPOLIS—The Franklin Auto Shoe Co.; $10,000; to manufacture emergency shoes for automobiles. William Featheringill, S. W. Featheringill and T. M. Hardy.

INDIANAPOLIS—Martindale-Millikan Co.; $85,000; manufacturing automobiles. F. M. Millikan, F. N. Martindale and J. N. Staley.

INDIANAPOLIS—The Madison Motor Co.; $500,000; dealer. Cecil E. Gibson, William E. Moore and O. R. Ewing.

INDIANAPOLIS—Swan Motor Car Co.; $50,000; to manufacture and sell autos. Harry J. Herff, I. Porter Smith and H. Ralph Smith.

Iowa

GRINNEL—A new auto company has been formed here; $10,000. E. H. Spaulding is president and C. C. Doran, general manager.

SIOUX CITY—The Adams-Alexander Auto Co.; $35,000. No incorporators named.

WATERLOO—The Moore Mfg. Co.; $10,000; to build tanks, culverts and portable garages. E. L. Moore and others.

Kentucky

LOUISVILLE—Calhoun Automobile Co.; $1,000. W. G. Houghland, Mrs. McGhee Houghland and Homer Puryear.

LOUISVILLE—Central Garage; $1,000. Carl J. Epping, Loreetto Stagenberg and E. J. Cooney.

LOUISVILLE—The Robinson Mfg. Co.; $10,000; to manufacture automobile accessories. John C. Robinson and Robert F. Vaughan.

PADUCAH—Foreman Automobile Company; $50,000. S. E. Foreman, E. C. Phelps and T. A. Miller.

Maryland

BALTIMORE—The Annapolis Garage; $5,000. Ossin K. Mitchell and Clarence A. Beardmore.

BALTIMORE—Tire Sales Company; $5,000. Arthur P. Mosby, Carolyn B. Donnley and W. F. Kempel Jones.

Michigan

DETROIT—Loveland Co.; $75,000; dealers. H. B. Loveland, Ralph N. Mariam.

DETROIT—Parkview Auto Garage & Repair Co.; $3,000. Edmund H. Jenks, Elverton F. Jenks and William A. Smith.

DETROIT—Waco Schaffer Co.; $200,000; to manufacture an automobile engine invented by William Schaffer. Prominent Waco bankers are included among the stockholders.

DETROIT—Wetzell-Hall Co.; $25,000; manufacturers' agents. Thomas W. Wetzell, Chas. M. Hall and Don M. Coffman.

FLINT—Hamilton Radiator Co.; $10,000; to make radiators and other automobile parts.

NILES—State Motor Sales Co.; $300,000; to deal in automobiles and accessories; paid in $3,000. George Corell, J. M. Vann and Charles E. White.

Minnesota

ST. PAUL—Jitney Auto Transit Co.; $5,000. President, J. G. Wardell; vice-president, W. T. Kenny; secretary, D. D. Murphy; treasurer, J. D. Keough.

Missouri

JEFFERSON CITY—P. W. Hanicke Manufacturing Co.; $10,000. P. W. and Bertha Hanicke and August Clesle.

JEFFERSON CITY—Missouri and Texas Oil Co.; $100,000. William R. Affeldt, Emery Thompson and James A. Kemper.

KANSAS CITY—The Byerley-Hoole Tire & Repair Co.; $15,000. C. T. Byerley, John C. Hoole and H. A. Bautiller.

KANSAS CITY—The Four Wheel Drive Motor Co.; $500.00; to manufacture motor cars. Theodore Ditmars, H. A. Dougherty and S. B. Gatewood.

KANSAS CITY—General Auto Service Co.; $6,000. W. F. Schrieber, E. S. Grinham and John W. Scott.

KANSAS CITY—Kansas City Auto Parts Co.; $200,000. Gustave V. Nelson, Otto H. Nelson and Carl E. Kimpton.

KANSAS CITY—Sweeny Tractor Co.; $15,000. George E. Ricker, F. J. Sweeny and George E. Ricker, Jr.

ST. JOSEPH—The Herff-Brook Motor & Sales Co.; $15,000. C. E. Schwindler, John L. Keller and Howard A. Hall.

ST. LOUIS—Ballman-Whitten Manufacturing Co.; $10,000; to manufacture and deal in piston rings and other automobile and engine appliances. Edwin C. Ballman, Stahl A. Whitten and Emil Doerr.

ST. LOUIS—The Bee Tee Tire Co.; $12,000; to manufacture tires and repair automobiles. James D. Brennan, John P. Trader.

ST. LOUIS—Hil-Ko Rim Lock Co., 2037 Railway Exchange Bldg.; $25,000; to manufacture rim lock for auto wheel, demountable rim type. Frank D. Hiller, Jr., Pres.; Maurice R. Kohn, Vice-Pres. and Treas.; Chas. L. Pyne, Secy.

ST. LOUIS—The National Tire Co.; $16,000; to manufacture automobile tires, accessories, etc. William Geist, George W. Millis and Adolph Schlesinger.

ST. LOUIS—The Sterlin Transport & Auto Co.; $12,000. Jacob Hagelstein, Richard Mederacke and Gustave Koerner.

New Jersey

HADDON HEIGHTS—Mutual Tire & Rubber Co.; $125,000; to manufacture tires and other rubber goods. F. B. Platt.

NEWARK—Hassler Sales Co.; $5,000; to conduct a general auto business. Geo. A. Warren, Joseph H. Stienhardt, J. Milton Stienhardt, all of Newark.

TRENTON—The Jitney Transportation Co.; $25,000. No incorporators have been named.

New York City

NEW YORK CITY—Auto Parts Co.; $5,000; to manufacture automobile parts. W. H. Kelly, M. M. Hirson, A. A. Bertini, both of 44 Cedar street.

NEW YORK CITY—Brown Tube Distributing Co.; $25,000; to market the Brown Perfection Tube, etc. F. L. Smith, L. F. Smith, C. S. Averill. Hotel Bancroft, Worcester, Mass.

NEW YORK CITY—Criterion Taxi Co.; $1,000; automobile livery, etc. E. C. Kiesow, A. Kiesow, I. Kiesow. 615 E. 179th street.

NEW YORK CITY—Cornfield Resilient Wheel Co.; $400,000; to manufacture spring wheels for trucks, automobiles and other vehicles. Stanislao Verusio, W. H. Byrne, Noah Cornfield, Hotel Authorp.

NEW YORK CITY—East 73d Street Garage; $1,000. M. M. Hayward, F. B. Knowlton, E. M. Beyhn, 154 Nassau street.

NEW YORK CITY—Eggers-Knight Automobile Co.; $2,500; dealer. A. J. L. Knight, B. C. Eggers, B. C. Eggers, Jr., 1222 Spruce street, Richmond Hill.

NEW YORK CITY—Fay Motor Fabric Supply Co.; $20,000; to manufacture fabrics used on automobiles. E. M. Kimbark, G. M. Hessler, A. D. Moritz, all of 27 William street.

NEW YORK CITY—Federal Operating Corp.; $6,000; truck business. M. D. Herron, R. A. Hays, H. B. Ackland, all of 146 W. 52d street.

NEW YORK CITY—Fifth Avenue Auto School; $12,000. A. B. J. Heingaertner, Anna Heingaertner, C. H. Furlong. 190 Devoe street, Brooklyn.

NEW YORK CITY—A. W. Harris Co.; $25,000; lubricating oils and greases. D. F. Hiscock, Warren Bigelow, H. M. Simon, all of 44 Pine street.

NEW YORK CITY—Heindl & Rothvoss; $3,000; dealer. M. J. Heindl, Arnold Rothvoss, E. J. Aplin. 598 W. 191st street.

NEW YORK CITY—Hoffman Motor Car Co.; $10,000; dealer. A. L. Friedberg, H. H. Miller, M. J. Neumann. 140 Nassau street.

NEW YORK CITY—Lee Garage; $5,000 E. P. Roome, W. H. Roome, J. C. Rogers, 340 Madison avenue.

NEW YORK CITY—Motor Utilities Co.; $25,000; to manufacture devices for automobiles. L. E. Johnson, R. C. Lipman, R. E. McLear, 115 Broadway.

NEW YORK CITY—Multiple Worm Axle Corp.; $100,000; to manufacture driving gear for automobiles. A. W. Chase, J. R. Rowland, A. L. Kull, 1790 Broadway.

NEW YORK CITY—Carl H. Page Motors Co.; $100,000. Carl H. Page, 1806 Broadway; H. B. Leary and A. J. Bryant, both of 55 Broadway.

NEW YORK CITY—Pneumatic Spring Equipment Co.; $50,000; to manufacture pneumatic springs. J. L. Wehrmann, C. J. Beasley, H. Seibel, 333 13th street, W. New York, N. J.

NEW YORK CITY—Republic Auto Painting Co.; $2,000. Morris Alper, L. Cohn, Sam Reisman, 765 Garden street, Bronx.

NEW YORK CITY—Second Avenue Taxi & Touring Car Co.; $3,000; renting. G. Perlmutter, P. Hartenstein, K. Hartenstein, 85 Second avenue.

NEW YORK CITY—Sheepshead Bay Velodrome Corp.; $5,000. T. J. Gillis, Richard Butler and Daniel Lang, all of Hupfel Bldg., 161st street and 3d avenue, Bronx.

NEW YORK CITY—R. B. Stanley Mfg. Co.; $10,000; to manufacture motors. R. B. Stanley, A. D. Stanley, G. B. Palmer, all of 11 E. 48th street.

NEW YORK CITY—Yours Truly Garage; $3,000. A. H. Tramer, Israel Efrus, Jacob Efrus, 8 E. 108th street.

New York

ADDISON—Addison Auto Bus Co.; $5,000; bus line from Corning to Hornell. C. A. Brewster, E. C. Smith, W. R. Park, all of Addison.

BINGHAMTON—Taber Carbureter Co.; $100,000; to manufacture carbureters. G. H. Taber, W. L. Ford, A. W. Ford, all of Binghamton.

BROOKLYN—The Famous Tire & Rubber Co.; $15,000. Emanuel Newman, William Jackson and R. A. Ihne, of Brooklyn.

BROOKLYN—The Manroot Motor Co.; $100,000. A. W. Behrens, Henry Monroe, of Brooklyn, and Jacob Schefer, of Newark.

BROOKLYN—Standard Motor Service; $10,000. A. P. Leibinger, O. P. Amend, H. M. Landgraff, 156 97th street.

BROOKLYN—Watkins Street Garage; $5,000. Wm. Domroe, Abr. Bernstein, Solomon Morris, 464 Hamburg avenue.

BROOKLYN—Wittenberg & Helmus; $2,000; dealer. B. Wittenberg, W. Wittenberg, Edw. Helmus, 103 Linwood street.

BUFFALO—Detroit Electric Car Co.; $10,000; dealer. C. E. Sager, Helen Sager, G. B. Pratt, 331 Canterbury Road, Rochester.

BUFFALO—S. & S. Delivery Co.; $2,000; renting, delivery, etc. Edw. Sperry, Ida Sperry, Chas. Schoenhut, 352 William street.

KINGSTON—Ulster Garage; $5,000. J. M. Barnhart, C. E. Snyder, M. H. Snyder, 77 Clinton avenue.

NEW ROCHELLE—Fortuna Operating Corp.; $6,000; to promote automobile racing. W. S. Viele, G. H. C. Lischke, E. F. Roehm, 2504 Bathgate avenue, Bronx.

NEW ROCHELLE—New Rochelle Autobus Corp.; $5,000. W. B. Gray, J. W. Gray, T. Gilleran, the latter of 48 E. Kingsbridge Road, Bronx.

ROCHESTER—Beardsley-Gorsline; $10,000; to manufacture motors. N. A. Beardsley, D. E. Gorsline, T. C. Nixon.

SARATOGA SPRINGS—Saratoga Motor Carnival Assn.; $2,500; to promote automobile races. C. C. Van Deusen, E. D. Starbuck, W. W. Kelly.

SYRACUSE—Central City Taxi & Trucking Co.; $3,000. Wm. H. Draper, Fred. Martz, Michael Lemp, 205 Burnet avenue.

SYRACUSE—Mac Mfg. Co.; $50,000; automobile parts. F. F. MacLean, E. E. Tilton, Ben Wiles, 308 Maple street.

SYRACUSE—Syracuse Motor Transit Co.; $10,000; baggage, freight, transfer, transportation garage. Philip Manheim, George A. Smith, William H. Bissel, 498 South Salina street.

Nebraska

LINCOLN—Glass-Evans Auto Co.; $25,000. V. E. Evans, J. B. Glass and others.

OMAHA—The Consumers' Automobile Supply Co.; $5,000. Donald D. Troup, R. E. Smith and Wallace Troup.

OMAHA—Moses S. Miller, Milton S. Livingston, George W. Coe and John W. Parkhurst have filed articles of incorporation for the Master Sales Co., to deal in automobiles in Omaha. $25,000.

Ohio

AKRON—The Akron Livery Auto Co.; $40,000. C. F. Schnee.

WARREN—The Park Garage Co.; $5,000; auto garage and livery. I. H. Price, John A. Hitchcock, E. Culver, P. W. Boyle and William J. Hyde.

AKRON—H. A. Price Rubber Co.; $15,000; to make rubber articles. H. A. Price, E. E. McGalliard, John Rowley, Mary V. Price and Margaret McGalliard.

AKRON—The Punctureless Auto Tire Co.; $100,000. D. W. Alexander, Charles Rempes, Samuel A. Messner, William Wotring and W. L. Keller.

AKRON—The Summit Welding Garage & Machine Co.; $10,000; to operate a garage and a machine shop. H. G. Haun, J. G. Chalfant, Clarence Becker, Charles Fickles and V. M. Greer.